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Management and Outcomes of Binge-Eating Disorder (BED)

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Two of the co-Investigators on this report have financial conflict of interest in the subject matter (ongoing grants and consultancy to a pharmaceutical company; ongoing National Institute of Mental Health grants). Neither were a reviewer of any of their own studies or any studies in the drug class in which a financial COI is held. The Lead Investigator, who has no affiliation or financial involvement that conflicts with the material presented in this draft report, made the final determination in the assessment of studies and the body of evidence. None of the other investigators have any affiliations or financial involvement that conflicts with the material presented in this report.

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Preface

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We welcome comments on this systematic review. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by email to epc@ahrq.hhs.gov.

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Key Informants

In designing the study questions, the EPC consulted a panel of Key Informants who represent subject experts and end-users of research. Key Informant input can inform key issues related to the topic of the technical brief. Key Informants are not involved in the analysis of the evidence or the writing of the report. Therefore, in the end, study questions, design, methodological approaches and/or conclusions do not necessarily represent the views of individual Key Informants.

Key Informants must disclose any financial conflicts of interest greater than $10,000 and any other relevant business or professional conflicts of interest. Because of their role as end-users, individuals with potential conflicts may be retained. The TOO and the EPC work to balance, manage, or mitigate any conflicts of interest.

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Technical Expert Panel

In designing the study questions and methodology at the outset of this report, the EPC consulted several technical and content experts. Broad expertise and perspectives were sought. Divergent and conflicted opinions are common and perceived as healthy scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

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Prior to publication of the final evidence report, EPCs sought input from independent Peer Reviewers without financial conflicts of interest. However, the conclusions and synthesis of the scientific literature presented in this report does not necessarily represent the views of individual reviewers.

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Management and Outcomes of Binge-Eating Disorder (BED)

Structured Abstract

Objectives. To evaluate the effectiveness and the comparative effectiveness of treatments for binge-eating disorder (BED) and for loss-of-control (LOC) eating in bariatric surgery patients and children. Studies of BED therapies generally focus on pharmacological interventions, psychological and behavioral interventions, or a combination of two or more approaches. We also were interested in examining whether treatment effectiveness differed in subgroups based on sex, race, ethnicity, sexual orientation, body mass index (BMI), duration of illness, or coexisting conditions. A third aim was to examine the course of illness for BED and of LOC eating.

Data Sources. We searched MEDLINE,® EMBASE,® the Cochrane Library, Academic OneFile and the Cumulative Index to Nursing and Allied Health Literature (CINAHL®), from root through June 23, 2014. Eligible studies included randomized controlled trials (RCTs), non-randomized trials, meta-analyses and, in relation to course of illness, cohort and case-control studies.

Review Methods. Pairs of reviewers independently selected, extracted data from, and rated the risk of bias of relevant studies; they graded the strength of evidence using established criteria. We conducted quantitative syntheses through meta-analysis for some pharmacological treatment outcomes and synthesized all additional evidence qualitatively.

Results. We included 48 RCTs examining treatment options (45 of these trials concerned treatment for patients with BED). We assembled evidence concerning course of illness from 12 observational studies. Second-generation antidepressants, as a class, were superior to placebo in achieving abstinence and reducing binge episodes, binge days, eating-related obsessions and compulsions, and depression. However, the magnitude of effect was generally modest. Weight outcomes were mixed and therefore results were unclear. Topiramate, an anticonvulsant, was also superior to placebo for improving binge and other eating-relating outcomes, but not for decreasing depression. Topiramate had additional benefits, including reductions in susceptibility to hunger as a trigger and improvements in impulsivity. Evidence was insufficient for determining the benefits of other medications or comparisons between medications. Cognitive behavioral therapy (CBT) was superior to placebo in achieving abstinence and reducing binge frequency, susceptibility to hunger and eating concerns, and improving sense of control over eating. It was generally ineffective for reducing weight or depression. We found limited evidence that therapist-led CBT was superior to partially therapist-led CBT and structured self-help CBT for binge-eating outcomes, but we found no differences between formats for other outcome domains. Behavioral weight loss (BWL) treatment was superior to CBT for weight loss in the short term, but was less effective in relation to weight loss or reducing binge-eating in the longer term. In relation to potential harms from treatment, topiramate and fluvoxamine were both associated with sleep disturbance; topiramate was also associated with sympathetic nervous system arousal. We found insufficient evidence to comment on treatment outcomes for bariatric surgery patients or children with LOC eating. We also found limited evidence on course of either

illness. One exception is that we found that early adolescent binge or LOC eating behavior predicts future binge and LOC eating behavior.

Conclusions. We found BED treatment benefits from second generation antidepressants and CBT. Additional replication of studies is needed to reach conclusions concerning most other treatments or comparisons between treatments for BED and LOC patient populations. Our understanding of the natural history of these conditions is limited.

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Executive Summary

Background

Definition of Binge-Eating Disorder and Loss-of-Control Eating

Binge-eating disorder (BED) is characterized by recurrent episodes of binge eating, i.e., eating episodes that occur in a discrete period of time (≤2 hours) and involve the consumption of an amount of food that is definitely larger than most people would consume under similar circumstances. Other core features of BED are a sense of lack of control over eating during binge episodes, significant psychological distress (e.g., shame, guilt) about binge eating, and the absence of regular use of inappropriate compensatory behaviors.

In May 2013, the American Psychiatric Association (APA) recognized BED as a distinct eating disorder in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).[1] Previously (in the DSM-IV), BED had been designated as a provisional diagnosis.

Table A presents the DSM-IV and DSM-5 diagnostic criteria for BED and also provides definitions for "loss-of-control" eating. In the shift from provisional to formal diagnosis for BED, APA experts changed the criterion for frequency of BED from twice per week to once per week and the duration criterion from 6 months to 3 months, in line with those for bulimia nervosa (BN).

Table A. DSM-IV and DSM-5 diagnostic criteria for binge-eating disorder and frequently used definitions of loss-of-control eating

Disorder or Behavior	Criteria
DSM-IV[2] and DSM-5[1] Criteria for BED	1. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following: a. Eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat in a similar period of time under similar circumstances b. The sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating) 2. Binge-eating episodes are associated with three (or more) of the following: a. Eating much more rapidly than normal b. Eating until feeling uncomfortably full c. Eating large amounts of food when not feeling physically hungry d. Eating alone because of being embarrassed by how much one is eating e. Feeling disgusted with oneself, depressed, or very guilty after overeating 3. Marked distress regarding binge eating is present 4. The binge eating occurs, on average, a. at least 2 days a week for 6 months (DSM-IV frequency and duration criteria) b. at least 1 day a week for 3 months (DSM-5 frequency and duration criteria) 5. The binge eating is not associated with the regular use of inappropriate compensatory behavior (e.g., purging, fasting, excessive exercise) and does not occur exclusively during the course of anorexia nervosa or bulimia nervosa DSM-IV does not include a BED severity grading scale. Applicable to DSM-5 only, BED severity is graded as follows: Mild: 1 to 3 episodes per week Moderate: 4 to 7 episodes per week Severe: 8 to 13 episodes per week Extreme: 14 or more episodes per week

Table A. DSM-IV and DSM-5 diagnostic criteria for binge-eating disorder and frequently used definitions of loss-of-control eating (continued)

Disorder or Behavior	Criteria
Loss of Control Eating	No standardized definition exists for LOC eating; however, parameters commonly used to describe and quantify LOC eating include the following: 1. The presence of (an) objective binge-eating episode(s) (OBEs), whereby BED DSM criteria 1a and 1b above are met, *and/or* 2. The presence of (a) subjective binge-eating episode(s) (SBEs), whereby the amount of food consumed is not unambiguously large (as judged by the interviewer/assessor) but the patient views it as excessive and reports loss of control during such episodes; that is, BED DSM criterion 1b but not 1a is met, *and/or* 3. The presence of (a) subjective episode(s) of loss of control over eating among bariatric surgery patients, including engaging in eating behaviors that might be contraindicated after surgery.

BED = Binge-Eating Disorder; DSM = Diagnostic and Statistical Manual of Mental Disorders; LOC = loss of control; OBEs = objective binge-eating episode(s); SBEs = subjective binge-eating episode(s)

Loss-of-control (LOC) eating refers to recurrent binge-like eating behavior in individuals in whom diagnosis of threshold BED is challenging, such as bariatric surgery patients and children. After bariatric surgery, the gut size and capacity are significantly reduced, effectively rendering it physically impossible to consume an atypically large amount of food. Children may not meet the BED criterion of consuming an atypically large amount because their parents or others limit the quantity of food they consume or they are unable to provide accurate quantification of the amount they eat.

Prevalence of Binge-Eating Disorder and Loss-of-Control Eating

Prevalence estimates (and citations) are covered in more detail in the main report. In the United States, the prevalence of BED among adults is ~ 3.5 percent in women and ~ 2 percent in men based on DSM-IV criteria and slightly higher based on DSM-5 criteria. BED is more common (as high as 30 percent) among obese individuals;[3,4] it is more prevalent among Hispanic populations than among other groups defined by race or ethnicity. BED is typically first diagnosed in young adulthood (early to mid-20s); symptoms often persist well beyond midlife.[5-7]

The prevalence of LOC eating is unknown. In post-bariatric surgery patients, it may be as high as 25 percent.[8,9] In children at risk for adult obesity, because of either their own overweight or that of their parents, prevalence may be as high as 32 percent.[10]

Current Diagnostic Challenges and Controversies

In diagnosing BED, assessing whether a patient is eating an atypically large amount of food is not wholly quantitative; it requires the clinician's evaluation of the patient's self-report. Assessment by a structured clinical interview is considered the gold standard. We included only studies in which participants were identified as meeting DSM-IV or DSM-5 criteria for BED as determined through a structured interview.

Assessing BED and LOC in children poses unique challenges, in part because neither the DSM-IV nor the DSM-5 established a minimum age for a BED diagnosis. As a result, when diagnosing adolescents, some clinicians consider BED criteria and others consider LOC eating criteria. We included studies of LOC eating in children ages 6 years and older.

In the post-bariatric surgery circumstance, defining LOC eating is not straightforward; assessment methods are not standardized. Patients may report their disordered eating behaviors as a general *subjective* sense of lack of control over their eating rather than in terms of specific overconsumption based on the amount of food. Also, LOC eating may manifest in the consumption of food types and patterns of intake that are contraindicated after surgery.

Current Challenges and Controversies in Treating These Disorders

Current Treatment Options for Binge-Eating Disorder

Treating patients with BED targets the core behavioral features (binge eating) and psychological features (i.e., eating, weight and shape concerns, distress) of this condition. Other important targets of treatment include metabolic health (in patients who are obese, diabetic, or both) and mood regulation (in patients with coexisting depression or anxiety, for example). Table B describes commonly used approaches. Treatments for LOC eating for post-bariatric surgery patients and children reflect BED treatment options; treatment of children is likely to include a role for parents.

Table B. Treatments commonly used for binge-eating disorder

Intervention Type	Treatment	Description
Psychological or behavioral	Cognitive behavioral therapy	Psychotherapy that focuses on identifying relations among thoughts, feelings, and behaviors, aiming to change negative thoughts about oneself and the world and, by doing so, reduce negative emotions and undesirable behavior patterns. Cognitive behavioral therapy is delivered is various ways – e.g., therapist-led individual and group sessions, self-help, and guided self-help.
Psychological or behavioral	Dialectical behavioral therapy	Behavioral therapy that focuses on increasing mindfulness and developing skills to improve emotion regulation, distress tolerance, and interpersonal relationships.
Psychological	Interpersonal psychotherapy	Psychotherapy that focuses on the role of interpersonal functioning on negative mood, psychological distress, and unhealthy behaviors.
Behavioral	Behavioral weight loss	Treatment that incorporates various behavioral strategies to promote weight loss, such as caloric restriction and increased physical activity.
Pharmacological	Second-generation and tricyclic anti-depressants	A class of medications that works by selectively inhibiting reuptake of neurotransmitters involved in the regulation of mood and appetite (i.e., dopamine, norepinephrine, and serotonin). Common examples include bupropion, citalopram, desipramine, duloxetine, fluoxetine, and sertraline, commonly indicated for patients with depression.
Pharmacological	Anti-convulsants	A class of medications used to treat epilepsy, bipolar disorder, major depression, and migraines; most commonly, topiramate.
Pharmacological	Anti-obesity	Medications used to treat obesity. One example is orlistat, which inhibits pancreatic lipase, thereby decreasing fat absorption in the gut.

Scope and Key Questions

This review addresses the efficacy and effectiveness of interventions for individuals meeting DSM-IV or DSM-5 criteria for BED, for children with LOC eating, and for post-bariatric surgery patients with LOC eating. (Hereafter, the term effectiveness refers to both efficacy and effectiveness.) We also attempted to examine whether treatment effectiveness differed in subgroups based on sex, race, ethnicity, sexual orientation, BMI, duration of illness, or coexisting conditions.

Broadly, we included pharmacological, psychological, behavioral, and combination interventions. We considered physical and psychological health outcomes in four major categories: (1) binge behavior (binge eating or LOC eating); (2) binge-eating-related psychopathology (e.g., weight and shape concerns, dietary restraint); (3) physical health functioning (i.e., weight and other indices of metabolic health such as diabetes); and (4) general psychopathology (e.g., depression, anxiety). Additional outcomes of interest included health care costs, social and occupational functioning, and harms of treatment.

We also examine the course of illness of BED and of LOC eating, particularly given its relatively high comorbidity with other medical and psychiatric conditions. In addition, clinical interest in understanding whether LOC eating reliably predicts poorer weight outcomes and new-onset BED over time is considerable. Little is known about the temporal stability of BED in the community, generally, and of LOC in post-bariatric surgery patients and children, specifically.

Ultimately, the information produced in this review is intended to contribute to improved care for patients, better decisionmaking capacity for clinicians, and more sophisticated policies from those responsible for establishing treatment guidelines or making various insurance and related decisions.

Key Questions

We addressed 15 Key Questions (KQs) (listed below). Nine are about effectiveness of treatment (benefits and harms overall and benefits for various patient subgroups)—three for BED, three for LOC eating among bariatric surgery patients, and three for LOC eating among children. The other six KQs deal with course of illness, overall and for various subgroups, for BED or LOC eating.

KQ 1: What is the evidence for the effectiveness of treatments or combinations of treatments for binge-eating disorder?

KQ 2: What is the evidence for harms associated with treatments for binge-eating disorder?

KQ 3: Does the effectiveness of treatments for binge-eating disorder differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

KQ 4: What is the course of illness of binge-eating disorder?

KQ 5: Does the course of illness of binge-eating disorder differ by age, sex, race, ethnicity, sexual orientation, body mass index, duration of illness, or coexisting conditions?

KQ 6: What is the evidence for the effectiveness of treatments or combinations of treatments for loss-of-control eating among bariatric surgery patients?

KQ 7: What is the evidence for harms associated with treatments for loss-of-control eating among bariatric surgery patients?

KQ 8: Does the effectiveness of treatments for loss-of-control eating among bariatric surgery patients differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

KQ 9: What is the course of illness of loss-of-control eating among bariatric surgery patients?

KQ 10: Does the course of illness of loss-of-control eating among bariatric surgery patients differ by age, sex, race, ethnicity, sexual orientation, initial body mass index, duration of illness, or coexisting conditions?

KQ 11: What is the evidence for the effectiveness of treatments or combinations of treatments for loss-of-control eating among children?

KQ 12: What is the evidence for harms associated with treatments for loss-of-control eating among children?

KQ 13: Does the effectiveness of treatments for loss-of-control eating among children differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

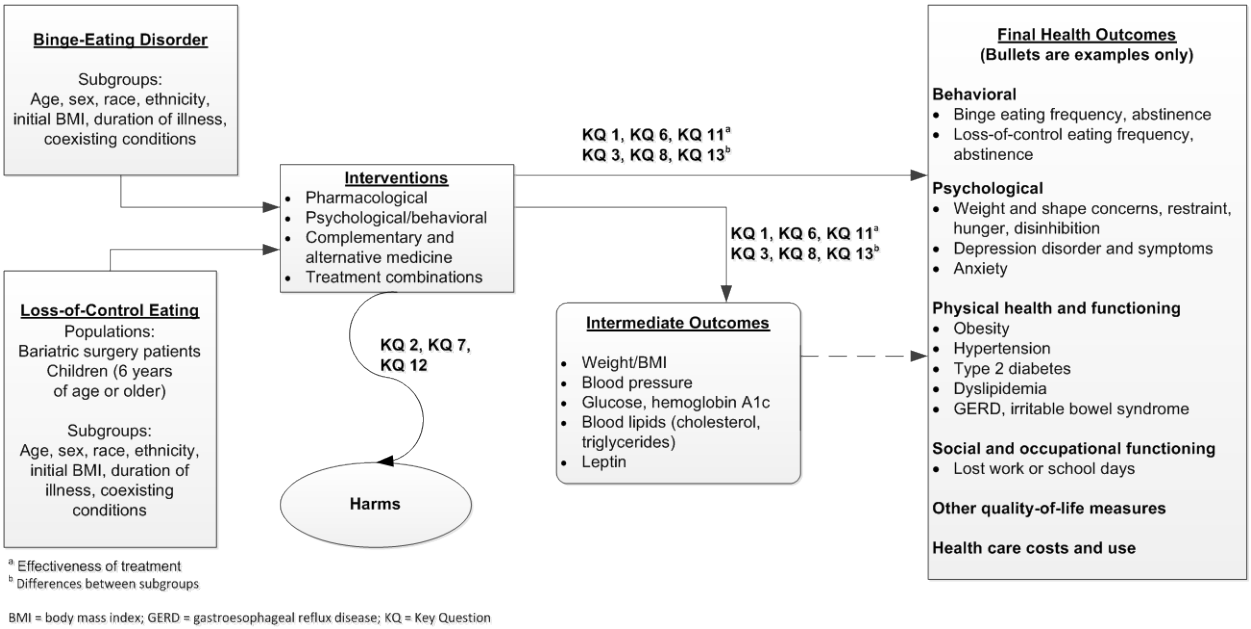
KQ 14: What is the course of illness of loss-of-control eating among children?

KQ 15: Does the course of illness of loss-of-control eating among children differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

Analytic Frameworks

The relationships among the patient populations, interventions, comparators, outcomes, and timing of outcomes assessment (PICOTs) are depicted for each treatment KQ in Figure A and for each course of illness KQ in Figure B.

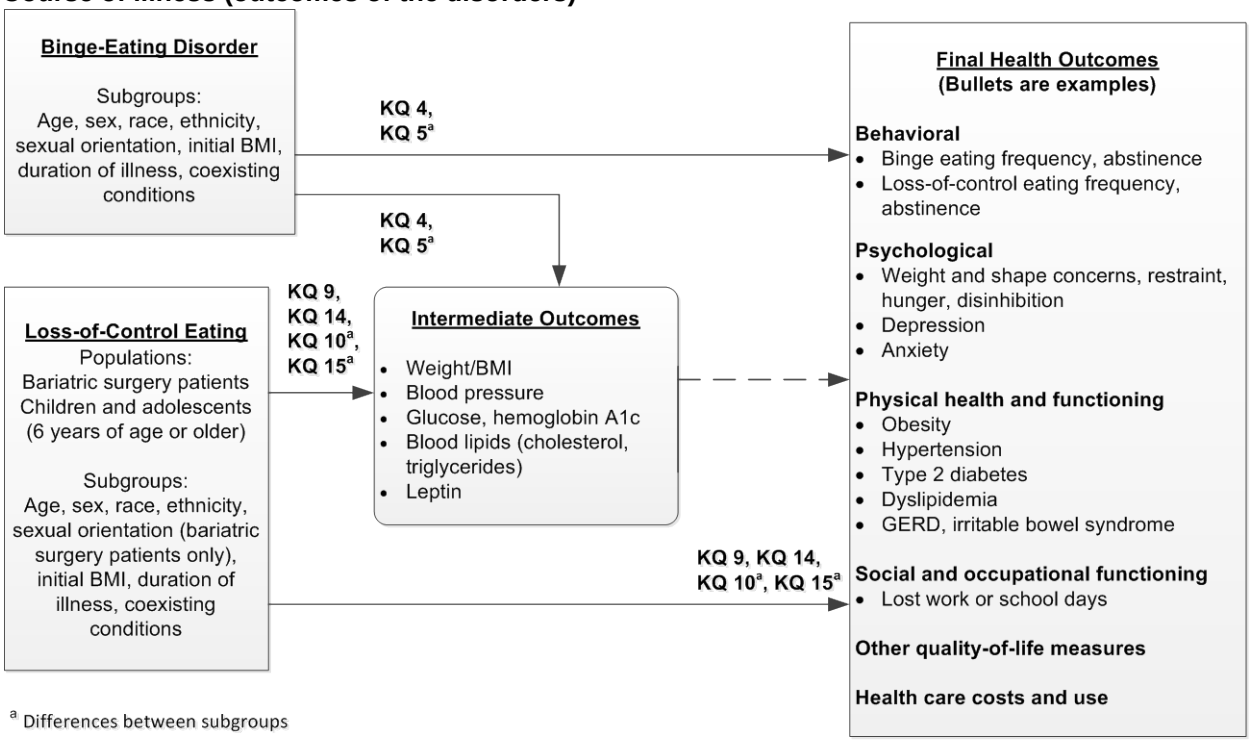
Figure A. Analytic framework for binge-eating disorder and loss-of-control eating: Effectiveness and harms of interventions



[a] Effectiveness of treatment
[b] Differences between subgroups

BMI = body mass index; GERD = gastroesophageal reflux disease; KQ = Key Question

Figure B. Analytic framework for binge-eating disorder and loss-of-control eating: Course of illness (outcomes of the disorders)



[a] Differences between subgroups

BMI = body mass index; GERD = gastroesophageal reflux disease; KQ = Key Question

Methods

Topic Refinement and Protocol Review

This topic and its KQs were developed through a public process. The Binge-Eating Disorder Association nominated the topic. The RTI International – University of North Carolina Evidence-based Practice Center (RTI-UNC EPC) further developed and refined the topic with input from Key Informants in the field. The Agency for Healthcare Research and Quality (AHRQ) posted provisional KQs for public comment (1/13/2014). We incorporated public comments and guidance from a Technical Expert Panel into the final research protocol (posted on the AHRQ Web site 4/23/2014).

Literature Search Strategy

Search Strategy

We conducted focused searches of MEDLINE® (via PubMed), EMBASE, CINAHL (nursing and allied health database), Academic OneFile, and the Cochrane Library. An experienced research librarian used a predefined list of search terms and medical subject headings (MeSH). The librarian completed the searches for the draft report on 6/23/2014; she will update the searches during peer review.

We searched for relevant unpublished and grey literature, including trial registries, specifically ClinicalTrials.gov and Health Services Research Projects in Progress. AHRQ requested Scientific Information Packets (SIPs) from the developers and distributors of interventions identified in the literature review. We included unpublished studies that met all inclusion criteria and contained enough information to permit us to make a standard risk-of-bias assessment. We searched reference lists of pertinent review articles for studies that we should consider for inclusion in this review, including our earlier review on this topic.[11-13]

Inclusion and Exclusion Criteria

We developed inclusion and exclusion criteria with the PICOTS framework in mind. We considered only trials or studies reported written in English; additional evidence possibly available in non-English language studies but with an abstract in English is also discussed.

The populations of interest are (1) individuals meeting DSM-IV or DSM-5 criteria for BED; (2) post-bariatric surgery patients with LOC eating; or (3) children with LOC eating. We excluded studies of individuals with co-occurring anorexia nervosa or bulimia nervosa and studies of children younger than 6 years of age. We excluded trials with fewer than 10 participants and nonrandomized studies with fewer than 50 participants.

Treatments of interest include pharmacological (e.g. antidepressants, anticonvulsants, attention deficit hyperactivity disorder medications, and weight loss medications) and behavioral and psychological (e.g., cognitive behavioral therapy, interpersonal psychotherapy, and dialectical behavior therapy). (We sought evidence on complementary and alternative medicine treatments but did not find any, and such interventions are not further discussed.) Treatment combinations could involve psychological and behavioral interventions or psychological and pharmacological interventions. Included studies had to have at least two groups. Acceptable

comparisons included one of the other treatment comparisons, placebo, nonintervention, waitlist controls, or treatment as usual.

We specified a broad range of outcomes—intermediate and final health benefit outcomes and treatment harms (Figures A and B). We analyzed five groups of treatment effectiveness and course of illness outcomes: binge-eating outcomes, eating-related psychopathology outcomes, weight-related outcomes, general psychological outcomes (such as depression), and other (such as quality of life). Potential harms (also a broad range of minor to severe side effects or adverse events) varied across intervention types. Outcome differences for subgroups were evaluated for both treatment effectiveness and course of illness. We reported treatment outcomes at the end of treatment or later, but course of illness studies had to have a 1-year minimum followup from the diagnosis.

We included studies with inpatient or outpatient settings. We did not exclude studies based on geography.

Study designs included meta-analyses, systematic reviews, randomized controlled trials (RCTs), and nonrandomized controlled trials, prospective and retrospective cohort studies, and case-control studies. We counted systematic reviews only if they provided information used in the evidence synthesis.

Study Selection

Trained members of the research team reviewed article abstracts and full-text articles. Two members independently reviewed each title and abstract using the predefined inclusion and exclusion criteria. Studies marked for possible inclusion by either reviewer underwent a full-text review. Two members of the team independently reviewed each full-text article. If both reviewers agreed that a study did not meet the eligibility criteria, it was excluded; each reviewer recorded the primary reason for exclusion. If reviewers disagreed, they resolved conflicts by discussion and consensus or by consulting a third member of the review team. We screened unpublished studies and reviewed SIPs using the same title/abstract and full-text review processes. The project coordinator tracked abstract and full-text reviews in an EndNote database (EndNote® X4).

Data Abstraction

We developed a template for evidence tables using the PICOTS framework and abstracted relevant information into them using Microsoft Excel. We recorded characteristics of study populations, interventions, comparators, settings, study designs, methods, and results. Six trained members of the team participated in the data abstraction. One reviewer initially abstracted the relevant data from each included article; a second more senior member of the team reviewed each data abstraction against the original article for completeness and accuracy.

Risk-of-Bias Assessment

We assessed risk of bias with three appropriate tools (described more fully in the main text): (1) one for judging trials based on the Cochrane risk-of-bias tool for RCTs and summary judgments corresponding with EPC guidance (2) one for evaluating risk of bias in non-RCTs and observational studies (modified from two existing tools); and (3) AMSTAR, for assessing the quality of a systematic review. Two independent reviewers rated the risk of bias for each study.

Disagreements between the two reviewers were resolved by discussion and consensus or by consulting a third member of the team.

Risk of bias is reported as a rating of low, medium, or high. RCTs with a high risk of bias are those with at least one major issue that has the potential to cause significant bias and thus might invalidate its results; such flaws include different application of inclusion/exclusion criteria between arms, substantial differences in arms at baseline, high overall attrition, differential attrition across arms that is not adequately addressed through analytic methods, or lack of control for concurrent treatment. A key consideration in evaluating the risk of bias of cohort and case control studies (only for our course of illness analyses) was control for critical potential confounding through design or statistical analyses. If critical information for making that assessment was not reported or unclear or if the conduct or analysis was severely flawed, we rated the study as high risk of bias.

To maintain a focus on interpretable evidence, we opted generally not to use trials with a high risk of bias in synthesizing treatment benefits. However, we did consider high risk-of-bias studies in sensitivity analyses of our meta-analyses of treatment benefits and as allowable evidence for both treatment harms and course of illness.

Data Synthesis

For quantitative synthesis (meta-analyses to estimate overall effect sizes using Comprehensive Meta-Analysis, version 3.2), we had sufficiently similar evidence only from placebo-controlled trials of certain pharmacological interventions. We did all other analyses qualitatively, based on our reasoned judgment of similarities in measurement of interventions and outcomes, and homogeneity of patient populations.

Strength of the Body of Evidence

We graded the strength of evidence based on the EPC Methods Guide.[14] The EPC approach incorporates five key domains: study limitations, directness, consistency, and precision of the evidence and reporting bias.

Grades reflect the strength of the body of evidence to answer each KQ. A grade of high strength of evidence indicates that we have high confidence that the evidence reflects the true effect. Moderate strength of evidence indicates that we have moderate confidence that the evidence reflect the true effect. Low strength of evidence suggests that we have low confidence that the evidence reflects the true effect. Insufficient evidence signifies that the evidence is not available, that we are unable to estimate an effect, or that we have no confidence in the estimate of the effect. Two reviewers assessed each domain independently and also assigned an overall grade for comparisons for each key outcome; they resolved any conflicts through consensus discussion. If they did not reach consensus, the team brought in a third party to settle the conflict.

Applicability

We assessed the applicability both of individual studies and of the body of evidence. For individual studies, we examined factors that may limit applicability (e.g., characteristics of populations, interventions, or comparators). Such factors may lessen our ability to generalize the effectiveness of an intervention to use in everyday practice. We abstracted key characteristics of applicability into evidence tables. During data synthesis, we assessed the applicability of the body of evidence using the abstracted characteristics.

Peer Review and Public Commentary

Experts in BED and LOC eating, specifically clinicians and researchers specializing in pharmacotherapy treatment, psychotherapy and behavioral treatment, pediatrics, and evidence-based interventions, were invited to provide external peer review of the draft review. AHRQ and an Associate Editor, who are leaders in their respective fields and are actively involved as directors or leaders at their EPC, also provided comments. The draft report will be posted on the AHRQ Web site for 4 weeks to elicit public comment. We will respond to all reviewer comments and note any resulting revisions to the text in the "Disposition of Comments Report." This disposition report will be made available 3 months after AHRQ posts the final review on its Web site.

Results

We report results by KQ, grouped basically by intervention comparison (for treatment effectiveness and harms). We cover BED, then LOC eating, and then course of illness findings in that order. Tables C-E (in discussion below) summarize key findings and strength of evidence grades. The full report contains summary tables (for results, reported in Chapters 3, 4, and 5). Appendix D of the main report documents risk-of-bias assessments; Appendix E presents evidence tables for all included studies.

Literature Searches

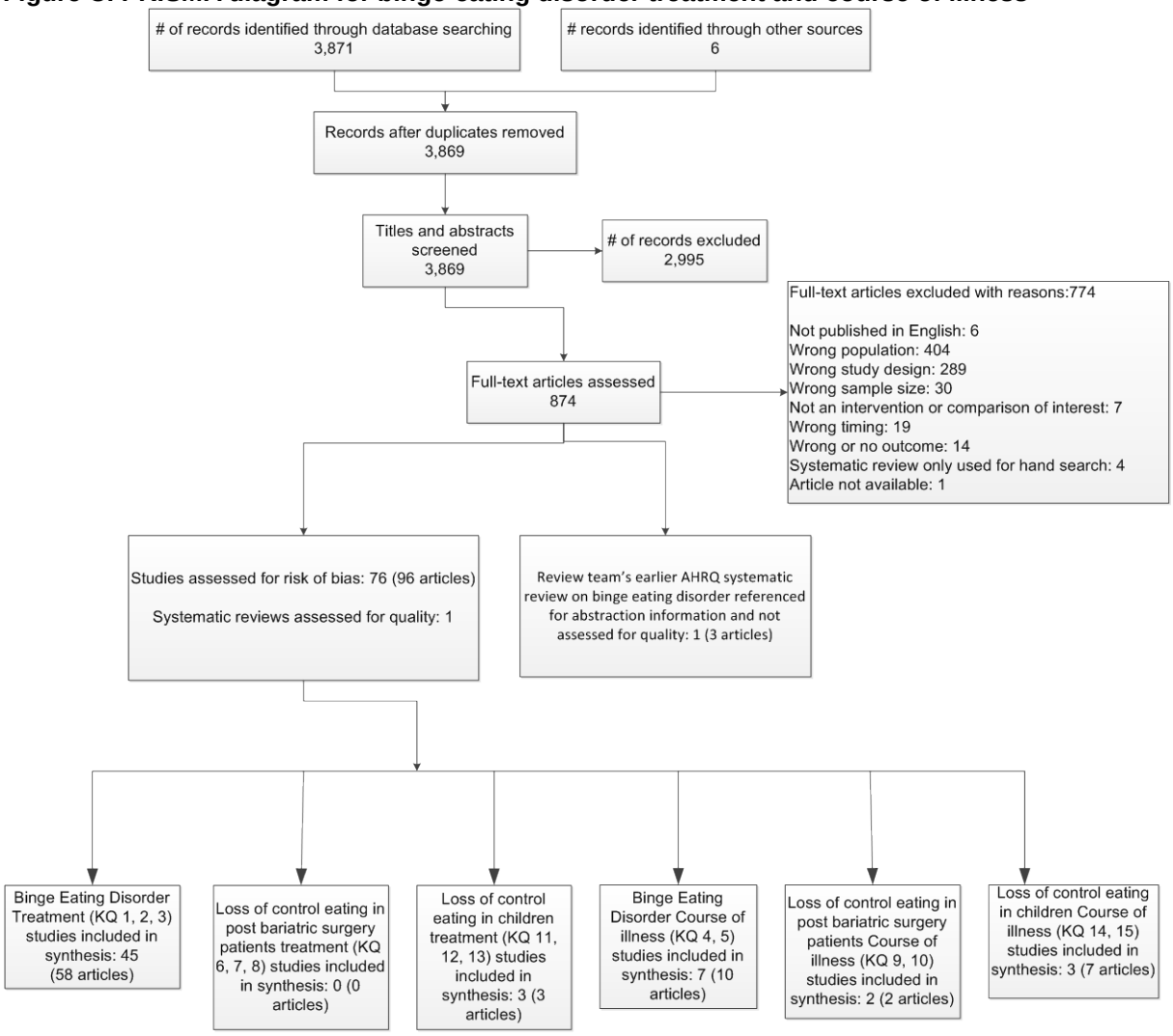
Figure C (the PRISMA diagram) depicts our literature search results. We identified a total of 3,869 unduplicated citations and determined that 874 met criteria for full-text review. We excluded 774 full-text articles based on our inclusion criteria and retained 100 articles reporting on a total of 78 trials or studies. Because we used some abstractions from our 2006 systematic review on eating disorders to develop some BED treatment and course of illness results, we consider that review as included evidence,[11-13] but we did not repeat quality assessments.

We did not use 17 studies in our main analyses of treatment benefits because of their high risk of bias. In keeping with standard approaches, however, we included two of these studies in sensitivity analysis of our meta-analysis findings.[15,16] We also used seven of these studies in our assessment of treatment harms.[15-21]

Fifteen studies (19 articles) met inclusion criteria for course of illness KQs. We used all 15 studies in that evidence synthesis, regardless of our risk of bias rating for the study.

Of the 20 fair- or good-quality studies on treatment for BED from our previous systematic review, 19 trials met the inclusion criteria for this review. One study was excluded because it used sibutramine, a treatment method no longer available in the United States.[22] Four studies[16,19,23,24] that we had originally rated as good or fair quality for the earlier review were newly rated as high risk of bias; we omitted them, therefore, from our main analyses. The earlier review also included three studies on BED course of illness that we have used here.[25-27]

Figure C. PRISMA diagram for binge-eating disorder treatment and course of illness



KQ = key question

Key Question 1. Effectiveness of Interventions for Binge-Eating Disorder

For treatment effectiveness for BED, we address three broad categories of treatment: pharmacological, psychological or behavioral, and combination treatments.

For medications, the 23 included trials involved second-generation antidepressants, anticonvulsants, an anti-obesity drug, and a variety of other agents including one dietary supplement. Among the antidepressants were several selective serotonin reuptake inhibitors (SSRIs) and several agents that primarily inhibit norepinephrine reuptake (i.e., norepinephrine-dopamine reuptake inhibitor [NDRI] or selective serotonin-norepinephrine reuptake inhibitor [SNRI]).

In the category of psychological or behavioral treatments, the 23 included trials involved cognitive behavioral therapy (CBT), dialectical behavioral therapy, interpersonal psychotherapy, behavioral weight loss (BWL), and inpatient treatment.

Seven trials provided data on combination treatments, including pairings of CBT, BWL, hypocaloric diet, and diet counseling with either an antidepressant or an anti-obesity medication; two of the seven trials paired compound behavioral treatments (i.e., CBT plus BWL, CBT plus diet counseling) with an antidepressant. All trials testing a combination behavioral plus pharmacological treatment arm also included a comparable combination placebo-controlled treatment arm (e.g., CBT plus antidepressant compared with CBT plus placebo).

Given the variability in outcome reporting and treatment comparisons, we were able to conduct meta-analyses only to measure effectiveness of antidepressant treatments, as a class, on several outcomes.

Pharmacological Interventions: Antidepressants Compared With Placebo

Eight RCTs (all placebo-controlled) examined effectiveness of antidepressants for treating BED patients. Of these, six involved an SSRI,[28-33] and one each involved an NDRI[34] or an SNRI.[35] In the six SSRI trials, two studied fluoxetine,[28,29] and one each studied citalopram,[33] escitalopram,[30] fluvoxamine,[31] and sertraline.[32] Assessments were conducted at the end of treatment.

As a class, antidepressants were associated with better binge-eating outcomes than placebo: abstinence (high strength of evidence for benefit), reduction in binge episodes per week (high strength of evidence for benefit), and reduction in binge days per week (low strength of evidence for benefit). Antidepressants were also associated with greater reductions in eating-related obsessions and compulsions (low strength of evidence for benefit). Although weight reductions were greater with antidepressants (low strength of evidence for benefit), body mass index (BMI) outcomes were not significantly different (low strength of evidence for no difference). Lastly, antidepressants were associated with greater reductions in symptoms of depression (low strength of evidence for benefit). The evidence was insufficient to evaluate outcomes for any specific antidepressant medication.

Pharmacological Interventions: Antidepressants Compared With Other Active Interventions

One trial involved a head-to-head comparison of two second-generation antidepressants (fluoxetine and sertraline).[36] The evidence was insufficient for concluding anything about treatment superiority.

Pharmacological Interventions: Anticonvulsants Compared With Placebo

Three placebo-controlled RCTs provided evidence about treating BED patients with anticonvulsants; two involved topiramate[37,38] and one lamotrigine.[39] Topiramate was associated with abstinence among a greater percentage of participants and with greater reductions in binge eating, binge-eating related obsessions and compulsions, weight, and global symptoms (moderate strength of evidence for benefit); it also produced greater reductions in cognitive restraint, hunger, disinhibition, and impulsivity (low strength of evidence for benefit). The evidence on the efficacy of lamotrigine was limited to one small trial (strength of evidence insufficient).

Pharmacological Interventions: Other Medications Compared With Placebo

Four placebo-controlled RCTs dealt with other pharmacological interventions. One trial each investigated the following: the sulfonic acid acamprosate, which is a mixed $GABA_A$ receptor agonist/NMDA receptor antagonist;[40] the μ-opioid antagonist ALKS-33 (also known as samidorphan);[41] the norepinephrine reuptake inhibitor atomoxetine;[42] and the dietary supplement chromium picolinate.[43] Chromium picolinate was studied at two dose levels: moderate (600 μg/day) and high (1000 μg/day). The strength of evidence is insufficient to determine effectiveness of any of these treatments because each was studied in a single, small sample trial.

Behavioral Interventions: Cognitive Behavioral Therapy Compared With No or Limited Intervention

CBT can be delivered in various formats; approaches include therapist-led, partially therapist-led, and self-help strategies (i.e., structured, guided, and pure). The two therapist-led approaches can involve either individual sessions (one-on-one) or group sessions.

Nine trials compared CBT with limited or no intervention.[44-52] Of 12 comparisons (in seven separate trials) involving CBT and waitlist controls, five involved therapist-led CBT,[44-48] two involved partially therapist-led CBT,[47,48] two used structured self-help CBT,[47,48] two used guided self-help CBT including one Internet-based guide[49] and one in-person guide,[50] and one used pure self-help CBT.[50] Two waitlist trials delivered CBT in an individual format[49,50] and five delivered CBT in a group format.[44-48]

Therapist-led CBT led to various improved outcomes including binge frequency, abstinence, and eating related psychopathology (all high strength of evidence for benefit). In contrast, reductions in BMI and depression were not greater (both moderate strength of evidence for no difference). Similarly, partially therapist-led CBT was related to improved binge frequency and abstinence outcomes (both low strength of evidence for benefit), but reductions in BMI and depression were not greater (both low strength of evidence for no difference). Structured self-help was also associated with reduced binge frequency (low strength of evidence for benefit) but no greater reduction in BMI or depression (low strength of evidence for no difference).

Five small RCTs examined the effectiveness of guided or pure self-help CBT, but they differed in delivery format or comparator and, therefore, evidence was insufficient for all comparisons and outcomes.

Behavioral Interventions: Cognitive Behavioral Therapy Compared With Cognitive Behavioral Therapy Variants

Seven trials compared CBT delivered in one format with CBT delivered in a different format.[47,48,50,53-56] Variations across trials resulted in four therapist-led comparisons: exposure versus cognitive restructuring;[53] therapist-led versus ecological momentary assessment;[54] individual versus group CBT led by a therapist;[55] and full versus partially therapist-led interventions.[47,48,56] Several self-help comparisons were also tested: one for guided self-help versus pure self-help,[50] and two for therapist-led versus structured self-help.

Only three of these comparisons were replicated in more than one trial. Binge-eating outcomes did not differ across comparisons of variations in therapist-led CBT with one exception favoring therapist-led over structured self-help in one trial (low strength of evidence for no difference). BMI and depression outcomes did not differ across types of CBT (both moderate strength of evidence for no difference).

Behavioral Interventions: Cognitive Behavioral Therapy Compared With Behavioral Weight Loss

Four trials compared CBT with BWL approaches;[52,57-59] one also compared CBT and BWL with CBT plus BWL.[58] The CBT format varied across trials and included both therapist led[57,58] and guided self-help.[52,59] For comparisons with therapist-led CBT, results were mixed. Binge frequency was lower in the therapist-led CBT arm and BMI reduction was greater in the BWL arm; the groups did not differ with respect to abstinence or eating-related psychopathology outcomes (all low strength of evidence). Evidence on comparisons with guided self-help was insufficient because all comparisons were limited to single, small trials.

Behavioral Interventions: Cognitive Behavioral Therapy Compared With Interpersonal Therapy

Three trials compared CBT with interpersonal therapies in treating patients with BED.[44,59,60] Two trials compared therapist-led interpersonal therapy with either therapist-led CBT[61] or guided self-help CBT.[59] Another trial compared therapist-led CBT with therapist-led interpersonal therapy.[44] Because trials differed in the intervention types that were compared, we could not synthesize results across trials (strength of evidence was insufficient for all outcomes).

Behavioral Interventions: Cognitive Behavioral Therapy Combined With Diet or Weight Loss Interventions

Three trials examined the use of CBT plus additional interventions involving either diet or weight loss strategies (or both) in treating patients with BED. These involved two trials comparing CBT alone with CBT plus a diet or weight loss intervention,[58,62] and a single trial comparing CBT plus a low energy dense diet with CBT plus general nutritional counseling. No significant differences were found for virtually any outcomes (strength of evidence was insufficient in all cases).

Behavioral Interventions: Behavioral Weight Loss

Two trials tested BWL interventions for BED patients. These compared guided self-help BWL with an active control[52] and therapist-led BWL with interpersonal therapy[59] Strength of evidence was insufficient because each comparison was limited to one small trial.

Behavioral Interventions: Psychodynamic Interpersonal Therapy Versus Waitlist

One small trial examined the effectiveness of therapist-led group psychodynamic interpersonal therapy.[44] Strength of evidence was insufficient for all outcomes.

Behavioral Interventions: Dialectical Behavioral Therapy

One trial evaluated therapist-led dialectical behavioral therapy against therapist-led active comparison group therapy (strength of evidence insufficient for all outcomes).[63-65]

Behavioral Interventions: Inpatient Treatment Versus Inpatient Treatment Plus Active Therapies

Three trials examined treatment in an inpatient setting.[66-68] In each trial, patients received a standard inpatient care program and were randomized to additional active therapies. Two trials

used virtual reality treatments that aimed to reduce body image distortions and food-related anxiety. However, these trials differed in several ways, and so results were all based on single, small studies (strength of evidence insufficient for all outcomes).

Pharmacological Interventions: Combination Treatments Compared With Placebo and With Other Treatments

Evidence about combination interventions consisted of seven placebo-controlled RCTs. In all seven trials, investigators combined a medication with a behavioral treatment; in two, they combined a medication with two behavioral treatments.[29,69] Three trials used an antidepressant;[29,69,70] one, an anticonvulsant;[71] and three, an anti-obesity agent.[72-74] The behavioral interventions included CBT in three trials,[29,71,73] BWL in one trial,[73] CBT plus BWL in one trial,[70] hypocaloric diet in one trial,[74] and group psychological support plus diet counseling in one trial.[69] The strength of evidence was insufficient to reach a conclusion concerning effectiveness of any specific combination treatment because each combination was studied only in a single, small trial.

Key Question 2. Harms Associated With Treatments or Combinations of Treatments for Binge-Eating Disorder

Virtually all harms were limited to pharmacotherapy intervention trials (reported in 28 trials). Harms associated with treating BED patients and discontinuations from studies attributable to harms occurred approximately twice as often in patients receiving pharmacotherapy than in those receiving placebo. The number of serious adverse events was extremely low. Topiramate was associated with a significantly higher number of sympathetic nervous system arousal and "other" events (moderate strength of evidence); fluvoxamine was associated with greater gastrointestinal upset and sleep disturbances (low strength of evidence). Few harms were measured in behavioral interventions.

Key Question 6 and 7. Effectiveness of Interventions (and Harms From Interventions) for Loss-of-Control Eating in Bariatric Surgery Patients

We found no evidence meeting our inclusion criteria that examined treatments or combinations of treatments for LOC eating among bariatric surgery patients.

Key Question 11 and 12. Effectiveness of Interventions (and Harms From Interventions) for Loss-of-Control Eating in Children

Three small trials examined behavioral interventions for children with LOC eating.[75-77] The trials differed in the definition of LOC eating that the investigators used to determine participant eligibility, treatment comparisons, and measures used to evaluate binge outcomes. Strength of evidence is insufficient for all outcomes.

Key Question 3, 8, and 13. Differences in the Effectiveness of Treatments or Combinations of Treatments for Subgroups: Adults

With Binge-Eating Disorder, Bariatric Surgery Patients With Loss-of-Control Eating and Children with Loss-of-Control Eating

We found no evidence to address this key question in any of our three populations of interest.

Key Question 4. Course of Illness Among Individuals With Binge-Eating Disorder

Our evidence included seven studies; five of these analyses followed patients who had been identified through their earlier participation in a treatment study.[25,26,78-83] Factors that individual studies identified as being related to better outcomes included more rapid response to treatment, improvement in eating-related psychopathology, and improvement in non-eating-related psychopathology. One study found increased odds of miscarriage among women with BED.[84]A review article of three studies found no evidence of increased risk of suicide among BED patients 5 years after treatment.[85](Strength of evidence was insufficient for all comparisons and outcomes.)

Key Question 9. Course of Illness Among Bariatric Surgery Patients With Loss-of-Control Eating

Two studies met our inclusion criteria but differed in the criteria they used for defining LOC eating before surgery.[27,86] Findings were not consistent across these two studies. (Strength of evidence is insufficient for all outcomes.)

Key Question 14. Course of Illness Among Children With Loss-of-Control Eating

Three longitudinal cohort studies met our inclusion criteria.[87-93] Early adolescent binge or LOC eating predicted similar behavior in later adolescence (low strength of evidence).

Discussion

Key Findings and Strength of Evidence

We limit our discussion to our most complex and key findings. These focus on the effectiveness of the most common treatments (KQ1) and harms (KQ2) for BED. Tables below document the main findings and strength of evidence grades. Other treatment results for BED, all treatment results for LOC eating and the course of illness for all disorders can be found in the results section above and in more detail in the main report (three results chapters).

Key Question 1. Effectiveness of Treatments or Combinations of Treatments for Binge-Eating Disorder

Commonly studied treatments for BED are pharmacological treatments and psychological and behavioral interventions. For outcomes of pharmacological treatments, our findings are limited to outcomes measured at the end of treatment. By comparison, patients enrolled in trials of psychological or behavioral treatments tended to undergo assessments beyond that point.

Table C summarizes the pharmacological interventions on which we had low, moderate, or high strength of evidence for clinical outcomes. We found evidence for the effectiveness of second-generation antidepressants, as a class, based on meta-analyses and for one anticonvulsant medication (topiramate) based on qualitative synthesis.

Table C. Strength of evidence for pharmacological interventions to improve outcomes in binge-eating disorder

Intervention and Comparator	Number of Studies (Sample Sizes)	Outcome and Results	Strength of Evidence
Second-generation Antidepressants versus Placebo	MA of 8 RCTs (N=416)	Antidepressants increased binge abstinence: OR=2.15 (95% CI 1.40 to 3.31, p = 0.001)	High for benefit
	MA of 7 RCTs (N=331)	Antidepressants decreased the frequency of binge episodes: SMD=−0.37 (95% CI −0.58 to −0.15, p = 0.001)	High for benefit
	MA of 3 RCTs (N=122)	Antidepressants decreased the frequency of binge days: SMD=−0.57 (95% CI −0.93 to −0.21, p < 0.001)	Low for benefit
	MA of 3 RCTs (N=122)	Antidepressants decreased eating-related obsessions and compulsions: SMD=−0.58 (95% CI −0.99 to −0.17, p = 0.006)	Low for benefit
	MA of 4 RCTs (N=182)	Antidepressants decreased weight: SMD=−0.41 (95% CI −0.74 to −0.07, p = 0.017)	Low for benefit
	MA of 6 RCTs (N=297)	No difference in BMI: SMD=−0.15 (95% CI −0.38 to 0.08, p = 0.194)	Low for no difference
	MA of 3 RCTs (N=142)	Antidepressants decreased symptoms of depression: SMD=−0.58 (95% CI −0.92 to −0.24, p = 0.001)	Low for benefit
Topiramate versus Placebo	2 RCTs (N=468)	Topiramate increased binge abstinence	Moderate for benefit
	2 RCTs (N=468)	Topiramate decreased the frequency of binge episodes	Moderate for benefit
	2 RCTs (N=468)	Topiramate decreased eating-related obsessions and compulsions	Moderate for benefit
	2 RCTs (N=468)	Topiramate decreased weight	Moderate for benefit
	1 RCT (N=407)	Topiramate improved general and eating-related psychological functioning indicated by increases in cognitive control of eating and decreases in symptoms of psychological distress, susceptibility to hunger, and disinhibition of control over eating	Low for benefit
	1 RCT (N=407)	Topiramate decreased impulsivity	Low for benefit
	1 RCT (N=407)	Topiramate decreased disability in family and social domains	Low for benefit

BMI = body mass index; CI = confidence interval; GI = gastrointestinal; MA = meta-analysis; N = number; OR = odds ratio; RCT = randomized controlled trial; SMD = standardized mean difference; SNS = sympathetic nervous system

As a class, second-generation antidepressants were superior to placebo for achieving BED-specific and related clinical outcomes but the magnitude of the benefits generally appear to be quite modest. Antidepressants reduced the weekly frequency of binge-eating episodes by approximately one-third of a binge episode per week and binge-eating days by approximately one-half of a day per week, but they were more than twice as likely as placebo to increase the odds of helping patients achieve abstinence from binge eating (high strength of evidence for benefit).

For treating psychological aspects and correlates of BED, antidepressants helped reduce binge-eating-related obsessive thoughts and compulsions and resulted in modest improvements in symptoms of depression (low strength of evidence for benefit).

We found fairly consistent evidence that overweight and obese patients treated with antidepressants lost a modest amount more weight during treatment than those who did not receive an antidepressant (approximately 1.7 pounds) (low strength of evidence for benefit). BMI showed no difference. Given the limited impact on weight and the short duration of treatment (6 to 12 weeks), finding no difference in the change in BMI at the end of treatment is not altogether surprising.

Topiramate (an anticonvulsant) reduced the frequency of binge eating by approximately one binge day per week more than placebo, and it helped approximately 30 percent more patients achieve abstinence from binge eating (moderate strength of evidence for benefit). In addition, compared to placebo, topiramate was associated with a 30 percent greater reduction in binge-eating-related obsessive thoughts and compulsions and a 23 percent greater reduction in general psychological distress symptoms (moderate strength of evidence for benefit). Among overweight and obese patients, those treated with topiramate lost, on average, approximately 10 pounds more (equivalent to ~4 percent more total body weight) than those who received placebo (moderate strength of evidence for benefit). Topiramate had additional benefits including reductions in patients' susceptibility to hunger as a trigger for binge eating and improvements in their general tendency to act less impulsively. Patients treated with topiramate also tended to experience increased sense of cognitive control over their binge eating and decreased disruptions in their social and family life compared with patients who received placebo. However, the strength of evidence for these benefits was low.

Table D summarizes the psychological and behavioral interventions for which we had low, moderate, or high strength of evidence for treatment benefits. We found evidence for all outcomes at the end of treatment and for some outcomes over periods as long as 6 years after treatment ended.

Table D. Strength of evidence for psychological or behavioral interventions to improve outcomes in binge-eating disorder

Intervention and Comparator	Number of Studies (Sample Sizes)	Outcome and Results	Strength of Evidence
Therapist-led CBT versus Waitlist	5 RCTs (N=344)	CBT decreased binge frequency	High for benefit
	4 RCTs (N=298)	CBT increased binge abstinence	High for benefit
	5 RCTs (N=344)	CBT decreased eating-related psychopathology	High for benefit
	5 RCTs (N=344)	No difference for BMI	Moderate for no difference
	5 RCTs (N=344)	No difference for depression	Moderate for no difference
Partially Therapist-led CBT versus Waitlist	2 RCTs (N=162)	CBT decreased binge frequency	Low for benefit
	2 RCTs (N=162)	CBT increased binge abstinence	Low for benefit
	2 RCTs (N=162)	No difference for BMI	Low for no difference
	2 RCTs (N=162)	No difference for depression	Low for no difference
Structured Self-help CBT versus Waitlist	2 RCTs (N=162)	CBT decreased binge frequency	Low for benefit
	2 RCTs (N=162)	No difference for BMI	Low for no difference
	2 RCTs (N=162)	No difference for depression	Low for no difference

Table D. Strength of evidence for psychological or behavioral interventions to improve outcomes in binge-eating disorder (continued)

Intervention and Comparator	Number of Studies (Sample Sizes)	Outcome and Results	Strength of Evidence
Therapist-led versus Partially Therapist-led CBT	3 RCTs (N=193)	No difference in binge frequency or abstinence	Low for no difference
	3 RCTs (N=193)	No difference in eating-related psychopathology	Low for no difference
	3 RCTs (N=193)	No difference in BMI	Low for no difference
	3 RCTs (N=193)	No difference in symptoms of depression	Low for no difference
Therapist-led versus Structured Self-help CBT	3 RCTs (N=199)	No difference in eating-related psychopathology	Low for no difference
	3 RCTs (N=199)	No difference in BMI	Low for no difference
	3 RCTs (N=199)	No difference in symptoms of depression	Low for no difference
Partially Therapist-led versus Structured Self-help CBT	3 RCTs (N=198)	No difference in binge frequency or abstinence	Low for no difference
	3 RCTs (N=198)	No difference in eating-related psychopathology	Low for no difference
	3 RCTs (N=198)	No difference in BMI	Low for no difference
	3 RCTs (N=198)	No difference in symptoms of depression	Low for no difference
Therapist-led CBT versus BWL	2 RCTs (N=170)	CBT decreased binge frequency more than BWL at end of treatment	Low for CBT benefit
	2 RCTs (N=170)	No difference in eating-related psychopathology	Low for no difference
	2 RCTs (N=170)	BWL decreased BMI more than CBT at end of treatment	Moderate for benefit
	2 RCTs (N=170)	No difference in symptoms of depression	Low for no difference

BMI = body mass index; BWL = behavioral weight loss; CBT = cognitive-behavioral therapy; N = number; RCT = randomized controlled trial

CBT reduced binge frequency and helped patients achieve abstinence compared to no treatment; these benefits were apparent for all three forms of CBT (therapist-led, high strength of evidence; partially therapist-led and structured self-help CBT, low strength of evidence). For reducing general and eating-related psychological symptoms, only therapist-led CBT was superior to waitlist in reducing patients' susceptibility to hunger and eating concerns and in improving their sense of control over eating (high strength of evidence for benefit). Across the various forms of CBT, treatment was generally no better than waitlist for reducing weight or symptoms of depression (moderate or low strength of evidence for no difference, depending on form of CBT). Nevertheless, collectively this body of evidence suggests that CBT helps patients with BED make improvements in several key behavioral and eating-specific psychological domains.

We found evidence comparing the effectiveness of three different forms of CBT: therapist-led CBT, partially therapist-led CBT, and structured self-help CBT. We generally found no differences in binge-eating outcomes between forms of CBT with the lone exception of one trial that suggested more favorable reduction in binge eating in patients who received therapist-led CBT than patients who received structured self-help CBT (low strength of evidence of no difference). Likewise, non-BED-specific outcomes did not differ across comparisons: neither BMI outcomes nor depression outcomes (both low strength of evidence of no difference) differed across comparisons of variations in therapist involvement in CBT.

We compared CBT, in various forms, with BWL treatment on outcomes assessed at the end of treatment and, in limited studies, for up to 6 years after treatment ended. We found mixed results in binge-eating and weight outcomes in relation to different forms of CBT and at different assessment time points. CBT was superior to BWL for decreasing binge frequency in the short

term (low strength of evidence for benefit). Across comparisons, CBT did not appear to have a clear advantage over BWL for helping patients achieve abstinence; however, two trials that followed patients for 2 years or more suggested more favorable abstinence outcomes in those who received CBT (collapsing across time, low strength of evidence for no difference in abstinence).

In contrast to our findings favoring CBT over BWL for short-term (and possibly longer-term) binge outcomes, we found that patients who received BWL lost more weight during treatment (moderate strength of evidence for benefit).

Key Question 2. Evidence for Harms Associated With Treatments for Binge-Eating Disorder

Potential harms or side effects were identified only in relation to pharmacotherapy. Table E summarizes the interventions for which we had low, moderate, or high strength of evidence for harms outcomes. Symptoms of sympathetic nervous system arousal were more common among patients who received topiramate than those who received placebo (moderate strength of evidence). These symptoms included sweating, dry mouth, rapid heart rate and similar physical side effects. Compared with placebo, topiramate was also associated with more nausea and vomiting (gastrointestinal [GI] upset), headaches, and sleep disturbances (low strength of evidence) as well as a collection of other symptoms including rash, high blood pressure, confusion, and taste aversion (moderate strength of evidence for collection of other events). Similarly, patients treated with fluvoxamine reported symptoms of GI upset and sleep disturbances more frequently than patients who received placebo (low strength of evidence).

Table E. Strength of evidence for harms of psychological or behavioral interventions in binge-eating disorder

Intervention and Comparator	Number of Studies (Sample Sizes, Number for Reported Events)	Outcome and Results	Strength of Evidence
Topiramate versus Placebo	2 RCTs (N=468, 83)	Topiramate higher number of events related to gastrointestinal upset	Low for harm
	2 RCTs (N=468, 240)	Topiramate higher number of events related to sympathetic nervous system arousal	Moderate for harm
	2 RCTs (N=468, 89)	Topiramate higher number of events related to sleep disturbance	Low for harm
	2 RCTs (N=468, 73)	Topiramate higher number of headaches	Low for harm
	2 RCTs (N=468, 179)	Topiramate higher number of other[a] events	Moderate for harm
Fluvoxamine versus Placebo	2 RCTs (N=105, 51)	Fluvoxamine higher number of events related to gastrointestinal upset	Low for harm
	2 RCTs (N=105, 123)	Fluvoxamine higher number of events related to sleep disturbance	Low for harm

[a] Includes bone fracture resulting from accidental injury, confusion, depression, eructation, hypertension (high blood pressure), language problems, rash or itching, respiratory illness, rhinitis, sinusitis, taste aversion, urinary hesitancy, others

N = number; RCT = randomized controlled trial;

Findings in Relation to What Is Already Known

Our 2006 review, *Management of Eating Disorders*,[11-13] included evidence on treatment and course of illness for BED. Based on our qualitative analysis of eight RCTs, we had concluded that antidepressants improved abstinence and binge frequency outcomes. Two subsequent meta-

analyses reached a similar conclusion, finding that antidepressants improved abstinence outcomes.[94,95]

Based on the evidence in this review, we have confirmed our earlier conclusion regarding the effectiveness of antidepressants for binge abstinence and binge frequency. We have also provided new findings regarding the effectiveness of antidepressants for eating-related obsessions and compulsions, weight, and depression outcomes. In the current review, we included one additional anticonvulsant RCT but were not able to add new information regarding effect size for anticonvulsant medications because of a high degree of heterogeneity across trials

For BED course of illness, our earlier review had identified only three studies. Although the size of the evidence base is larger for this review, the new studies provide little additional insight. They are mostly case series designs without comparisons or controls for potential confounding factors associated with outcomes, and they are limited to patients followed after treatment.

Our review is the only one that we have identified that has summarized the evidence on treatment and course of illness among individuals with LOC eating.

Implications for Clinical and Policy Decisionmaking

We had hoped to be able to comment on the effectiveness and harms of specific pharmacological and psychological or behavioral treatments for BED and on the comparative effectiveness of specific treatments for BED. For several key outcomes, we found clear evidence of modest sized benefit with antidepressants, as a class, and we were able to confirm previous observations of benefit with topiramate. However, because of insufficient evidence, we could not comment on the effectiveness of any other specific medication. We also found strong evidence of benefit with therapist-led CBT for several key outcomes as well as moderate evidence for benefit with partially-led therapist CBT and structured self-help for a smaller number of outcomes. However, because of insufficient evidence, we could not comment on the effectiveness of other psychological or behavioral treatments or on any combinations of treatments for BED. We found evidence of commonly known side effects with topiramate and fluvoxamine; however, harms of psychological and behavioral treatments were rarely reported. Therefore, based on the available evidence for both benefits and harms, clinicians may find antidepressants, topiramate, and CBT to be good choices for the treatment of BED. However, the comparative effectiveness of these and other treatments remains unclear and constitutes an area in need of further study. Head-to-head trials are needed to help decisionmakers identify best options for first-line and adjunct treatments, including trials that compare the effectiveness of different antidepressants, of antidepressants with other medications and with CBT, and of different modes of delivery of CBT. In particular, comparing different modes of delivery of CBT could be helpful to those making decisions that affect patient access to specialized treatment.

We wanted to comment on the potential impact of the DSM-5 change in the diagnostic criteria for BED. The binge frequency criterion has been lessened and duration of the illness has been shortened. Clinicians, patients, and policymakers might have considerable interest in knowing whether effective treatment options may differ in this newly included group of patients. Unfortunately, we found no studies that provided separate results for a patient population diagnosed according to DSM-5.

We also sought to provide useful evidence concerning effective treatments for individuals with LOC eating. RCTs of bariatric surgery patients with BED before surgery or with LOC eating before or after surgery have not been performed (or at least published).

Applicability

Findings about all interventions are likely to be applicable to all adults above the age of 18 with BED. However, because of insufficient evidence, we cannot comment on treatment applicability as it pertains to specific subgroups of adults. Also unclear is whether our findings apply to persons with BED who are younger than 18 years of age. The evidence base concerning treatment for LOC eating in children was small; for bariatric surgery patients, it was nonexistent. Thus, although the evidence may be generally applicable, the appropriate diagnostic criterion to use to identify LOC eating has not been established.

Despite the high comorbidity of BED and depression, not all studies included individuals with symptoms of depression. Furthermore, in those studies that reported changes in depression symptoms as an outcome, mean baseline levels of depression were generally mild to moderate and no studies specifically included individuals who met DSM criteria for major depression. Thus, it is unclear the extent to which our findings apply to persons with more severe comorbid depression or other common physical and psychological comorbidities.

In relation to treatment, we presented evidence on medications, psychological and behavioral treatments, and combinations of treatments. We note, however, that no medications are currently approved for treating BED patients by the U.S. Food and Drug Administration. Furthermore, in this review, we had planned to include complementary and alternative medicine approaches as well as other "non-traditional" approaches such as those that de-emphasize weight regulation, but we could not find any studies that met our criteria.

We took a broad view of outcomes of interest, but our primary focus was on reductions in commonly noted BED symptomatology, including binge frequency; eating-related obsessions and compulsions; restraint; eating, shape, and weight concerns; weight; and depression. However, we sought but did not find sufficient information to make any conclusions about more global measures such as quality of life, lost productivity, or disability. We also found no evidence about final health outcomes such as, for example, diabetes, gastric reflux, and irritable bowel syndrome.

Studies varied in their length of followup periods. Only two trials of medications measured outcomes beyond the end of treatment.[96,97] Psychological or behavioral interventions were more likely to include both short- and long-term followup but interventions differed across studies. Thus, it is unclear whether the benefits of treatment extend beyond the active treatment period.

Typically, the studies we found were conducted in supervised settings generally associated with academic research and medical centers in which medication treatment was managed by a psychiatrist and psychological and behavioral treatments were delivered by highly trained personnel. It is unclear, therefore, if our findings apply to the "real-world setting" in which individuals seek and receive treatment in their local community through contact with their primary care physician and/or other community-based providers who do not have specific expertise in BED treatment.

Limitations of the Review Process

For this review, we excluded non–English-language studies based largely on limitations of time and resources. However, we did examine English language abstracts of non-English language studies to assess the potential size of the literature that would be missed through this approach. Based on this exercise, we concluded that by limiting our review to English-language studies only, we may have missed one review of exercise as treatment for BED.

Research Gaps

We found no studies that addressed differences in treatment outcomes among important subgroups defined by age, sex, race, and other relevant patient characteristics. Observational and cross-sectional studies have shown that binge eating is more common among certain racial minorities, for example, yet treatment studies have failed to address whether outcomes differ between groups defined by race. These gaps limit applicability to these important groups.

Similarly, despite the high comorbidity between BED and depression and between BED and obesity, no studies specifically compared outcomes in groups of patients defined either by baseline level of depression or by baseline weight status. In light of growing awareness of LOC eating in children and concerns that LOC eating has negative health effects and predisposes to BED later in life, treatment studies focusing on children are needed.

We found evidence that CBT is beneficial for patients with BED; however, that conclusion was limited largely to therapist-led CBT because of insufficient information regarding other CBT formats. At present, the body of evidence for CBT constitutes a collection of disparate studies testing variations in format; furthermore, the rationale for comparing different formats is not consistently grounded in an a priori mechanism of action. Moving forward, there is a clear need for adequately powered replication studies of the most promising therapies.

The number of therapists with expertise in CBT for BED is limited in the United States. This limitation poses a challenge for implementation of our findings. One useful step might be to compare directly (in head-to-head trials) whether therapist-led CBT is superior to other CBT formats (such as partially therapist-led and various approaches to self-help). Those future studies should consider other psychological or behavioral interventions that have shown promise (interpersonal therapy; dialectical behavioral therapy), and they should be adequately powered to test for differences in outcomes across key subgroups (i.e., patient groups defined by age, sex, race, and weight status) for which a dearth of information still exists.

We found that antidepressants were beneficial in reducing symptoms of depression and that topiramate was beneficial for reducing symptoms of impulsivity. A head-to-head comparison of the effectiveness of these two treatment options on mood and impulse regulation outcomes would be useful for helping clinicians and patients make first-line pharmacotherapy treatment choices based on individual patients' needs and preferences. Despite current interest in complementary and alternative medicine, neutraceuticals, and mindfulness-based interventions for regulating appetite, eating behavior, and weight, the literature is deficient regarding these types of interventions for BED.

Deficiencies in Methods

In our 2006 review, we also highlighted several critical needs for advancing the field; these included replication studies, longer-term followup studies, and streamlining the number of outcome measures to eliminate reporting of false discoveries. Unfortunately, with few exceptions,[37,38,47,48] replication studies do not exist, and the evidence base remains insufficient to address whether gains achieved during short-term treatment persist after treatment ends. This gap is especially critical for pharmacological treatments, as patients and their providers seek to understand the need for on-going medical management to maintain treatment gains.

The field would benefit from the development of universally accepted definitions of remission and recovery.[98] To reach this goal, longer-term followup periods with periodic re-evaluation of a core set of psychological, behavioral, and physiological outcomes are needed.

Toward this goal, we make two recommendations. First, studies should implement a minimum 1-year followup period. Second, future studies should include a reasonably limited set of eating-specific and general psychological symptom (depression, anxiety) self-report instruments. Consistent and thorough reporting of these outcomes (e.g., fully descriptive data at each major assessment time point) will help improve calibration of these instruments against each other, which is ultimately needed for future efforts to use meta-analysis to evaluate treatment effect size. Further, we recommend that studies continue to measure and report binge frequency as both discrete binge episodes and binge days per week, as more data are needed to resolve whether one is the better choice for assessing treatment effects.

Conclusions

Overall, we found the body of evidence was small and either uneven across treatment types and comparisons or, in some areas of interest, nonexistent. Our meta-analyses provided strong and consistent evidence that second-generation antidepressants improved several binge-eating-related outcomes. Through qualitative synthesis, we also concluded that topiramate and therapist-led CBT can be beneficial. Additional RCTs are needed to replicate encouraging findings observed to date only in single trials. Investigators also need to conduct adequately powered trials upon which they base conclusions about treatment effectiveness and comparative effectiveness.

We found limited evidence about the course of illness in the three populations. Although the largest body of evidence concerns course of illness among children with LOC eating, the strength of the conclusions that we could draw were limited by the fact that the definition of LOC eating differed across studies.

References

1. American Psychiatric Association. Diagnostic and statistical manual of mental disorder (5th ed.). Fifth ed., Washington, D.C.: American Psychiatric Publishing; 2013.
2. American Psychiatric Association. Diagnostic and Statistical Manual for Psychiatric Disorders: Fourth Edition. Washington, DC: American Psychiatric Press; 1994.
3. Bruce B, Wilfley D. Binge eating among the overweight population: a serious and prevalent problem. J Am Diet Assoc. 1996 Jan;96(1):58-61. Epub: 1996/01/01. PMID: 8537571.
4. Spitzer RL, Yanovski S, Wadden T, et al. Binge eating disorders: its further validation in a multisite study. Int J Eat Disord. 1993;13(2):137-53.
5. Ozier AD, Henry BW, American Dietetic Association. Position of the American Dietetic Association: nutrition intervention in the treatment of eating disorders. J Am Diet Assoc. 2011 Aug;111(8):1236-41. Epub: 2011/08/02. PMID: 21802573.
6. de Baptista GA. Nutrients and dyspepsia: paradigms and reality. Current opinion in clinical nutrition and metabolic care. 2005 Sep;8(5):562-7. Epub: 2005/08/05. PMID: 16079630.
7. Guerdjikova AI, O'Melia AM, Mori N, et al. Binge eating disorder in elderly individuals. Int J Eat Disord. 2012 Nov;45(7):905-8. Epub: 2012/05/12. PMID: 22576715.
8. Colles SL, Dixon JB, O'Brien PE. Grazing and loss of control related to eating: two high-risk factors following bariatric surgery. Obesity (Silver Spring). 2008 Mar;16(3):615-22. Epub: 2008/02/02. PMID: 18239603.
9. de Zwaan M, Hilbert A, Swan-Kremeier L, et al. Comprehensive interview assessment of eating behavior 18-35 months after gastric bypass surgery for morbid obesity. Surg Obes Relat Dis. 2010 Jan-Feb;6(1):79-85. PMID: 19837012.
10. Tanofsky-Kraff M, Cohen ML, Yanovski SZ, et al. A prospective study of psychological predictors of body fat gain among children at high risk for adult obesity. Pediatrics. 2006 Apr;117(4):1203-9. PMID: 16585316.
11. Berkman ND, Bulik CM, Brownley KA, et al. Management of eating disorders. Evid Rep Technol Assess (Full Rep). 2006 Apr(135):1-166. Epub: 2007/07/14. PMID: 17628126.
12. Berkman ND, Lohr KN, Bulik CM. Outcomes of eating disorders: a systematic review of the literature. Int J Eat Disord. 2007 May;40(4):293-309. Epub: 2007/03/21. PMID: 17370291.
13. Brownley KA, Berkman ND, Sedway JA, et al. Binge eating disorder treatment: a systematic review of randomized controlled trials. Int J Eat Disord. 2007 May;40(4):337-48. Epub: 2007/03/21. PMID: 17370289.
14. Berkman ND, Lohr KN, Ansari M, et al. AHRQ Methods for Effective Health Care. Grading the Strength of a Body of Evidence When Assessing Health Care Interventions for the Effective Health Care Program of the Agency for Healthcare Research and Quality: An Update. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. Rockville, MD: Agency for Healthcare Research and Quality (US); 2008.
15. McElroy SL, Kotwal R, Guerdjikova AI, et al. Zonisamide in the treatment of binge eating disorder with obesity: a randomized controlled trial. J Clin Psychiatry. 2006 Dec;67(12):1897-906. Epub: 2006/12/30. PMID: 17194267.
16. Pearlstein T, Spurell E, Hohlstein LA, et al. A double-blind, placebo-controlled trial of fluvoxamine in binge eating disorder: a high placebo response. Arch Womens Ment Health. 2003 Apr;6(2):147-51. Epub: 2003/04/30. PMID: 12720065.
17. Ricca V, Castellini G, Lo Sauro C, et al. Zonisamide Combined with Cognitive

Behavioral Therapy in Binge Eating Disorder: A One-year Follow-up Study. Psychiatry (Edgmont). 2009 Nov;6(11):23-8. Epub: 2010/01/06. PMID: 20049147.

18. Brambilla F, Samek L, Company M, et al. Multivariate therapeutic approach to binge-eating disorder: combined nutritional, psychological and pharmacological treatment. Int Clin Psychopharmacol. 2009 Nov;24(6):312-7. Epub: 2009/10/02. PMID: 19794312.
19. Agras S, Telch CF, Arnow B, et al. Weight loss, cognitive-behavioral, and desipramine treatments in binge eating disorder. An additive design. Behav Ther. 1994;25(2):225-38.
20. Ricca V, Mannucci E, Mezzani B, et al. Fluoxetine and fluvoxamine combined with individual cognitive-behaviour therapy in binge eating disorder: a one-year follow-up study. Psychother Psychosom. 2001 Nov-Dec;70(6):298-306. Epub: 2001/10/13. PMID: 11598429.
21. Molinari E, Baruffi M, Croci M, et al. Binge eating disorder in obesity: comparison of different therapeutic strategies. Eat Weight Disord. 2005 Sep;10(3):154-61. Epub: 2005/11/10. PMID: 16277137.
22. Appolinario JC, Bacaltchuk J, Sichieri R, et al. A randomized, double-blind, placebo-controlled study of sibutramine in the treatment of binge-eating disorder. Arch Gen Psychiatry. 2003 Nov;60(11):1109-16. Epub: 2003/11/12. PMID: 14609886.
23. Gorin AA, Le Grange D, Stone AA. Effectiveness of spouse involvement in cognitive behavioral therapy for binge eating disorder. Int J Eat Disord. 2003 May;33(4):421-33. Epub: 2003/03/27. PMID: 12658672.
24. Telch CF, Agras WS, Linehan MM. Dialectical behavior therapy for binge eating disorder. J Consult Clin Psychol. 2001 Dec;69(6):1061-5. Epub: 2002/01/05. PMID: 11777110.
25. Fichter MM, Quadflieg N, Gnutzmann A. Binge eating disorder: treatment outcome over a 6-year course. J Psychosom Res. 1998 Mar-Apr;44(3-4):385-405. Epub: 1998/05/20. PMID: 9587882.
26. Wilfley DE, Friedman MA, Dounchis JZ, et al. Comorbid psychopathology in binge eating disorder: relation to eating disorder severity at baseline and following treatment. J Consult Clin Psychol. 2000 Aug;68(4):641-9. Epub: 2000/08/31. PMID: 10965639.
27. Busetto L, Segato G, De Luca M, et al. Weight loss and postoperative complications in morbidly obese patients with binge eating disorder treated by laparoscopic adjustable gastric banding. Obes Surg. 2005 Feb;15(2):195-201. Epub: 2005/04/02. PMID: 15802061.
28. Arnold LM, McElroy SL, Hudson JI, et al. A placebo-controlled, randomized trial of fluoxetine in the treatment of binge-eating disorder. J Clin Psychiatry. 2002 Nov;63(11):1028-33. Epub: 2002/11/26. PMID: 12444817.
29. Grilo CM, Masheb RM, Wilson GT. Efficacy of cognitive behavioral therapy and fluoxetine for the treatment of binge eating disorder: a randomized double-blind placebo-controlled comparison. Biol Psychiatry. 2005 Feb 1;57(3):301-9. Epub: 2005/02/05. PMID: 15691532.
30. Guerdjikova AI, McElroy SL, Kotwal R, et al. High-dose escitalopram in the treatment of binge-eating disorder with obesity: a placebo-controlled monotherapy trial. Hum Psychopharmacol. 2008 Jan;23(1):1-11. Epub: 2007/12/07. PMID: 18058852.
31. Hudson JI, McElroy SL, Raymond NC, et al. Fluvoxamine in the treatment of binge-eating disorder: a multicenter placebo-controlled, double-blind trial. Am J Psychiatry. 1998 Dec;155(12):1756-62. Epub: 1998/12/08. PMID: 9842788.
32. McElroy SL, Casuto LS, Nelson EB, et al. Placebo-controlled trial of sertraline in the treatment of binge eating disorder. Am J Psychiatry. 2000;157(6):1004-6.

33. McElroy SL, Hudson JI, Malhotra S, et al. Citalopram in the treatment of binge-eating disorder: a placebo-controlled trial. J Clin Psychiatry. 2003 Jul;64(7):807-13. Epub: 2003/08/26. PMID: 12934982.
34. White MA, Grilo CM. Bupropion for overweight women with binge-eating disorder: a randomized, double-blind, placebo-controlled trial. J Clin Psychiatry. 2013 Apr;74(4):400-6. Epub: 2013/05/10.
35. Guerdjikova AI, McElroy SL, Winstanley EL, et al. Duloxetine in the treatment of binge eating disorder with depressive disorders: a placebo-controlled trial. Int J Eat Disord. 2012 Mar;45(2):281-9. Epub: 2011/07/12. PMID: 21744377.
36. Leombruni P, Piero A, Lavagnino L, et al. A randomized, double-blind trial comparing sertraline and fluoxetine 6-month treatment in obese patients with Binge Eating Disorder. Prog Neuropsychopharmacol Biol Psychiatry. 2008 Aug 1;32(6):1599-605. Epub: 2008/07/05. PMID: 18598735.
37. McElroy SL, Arnold LM, Shapira NA, et al. Topiramate in the treatment of binge eating disorder associated with obesity: a randomized, placebo-controlled trial. Am J Psychiatry. 2003 Feb;160(2):255-61. Epub: 2003/02/04. PMID: 12562571.
38. McElroy SL, Hudson JI, Capece JA, et al. Topiramate for the treatment of binge eating disorder associated with obesity: a placebo-controlled study. Biol Psychiatry. 2007 May 1;61(9):1039-48. Epub: 2007/01/30. PMID: 17258690.
39. Guerdjikova AI, McElroy SL, Welge JA, et al. Lamotrigine in the treatment of binge-eating disorder with obesity: a randomized, placebo-controlled monotherapy trial. Int Clin Psychopharmacol. 2009 May;24(3):150-8. Epub: 2009/04/10. PMID: 19357528.
40. McElroy SL, Guerdjikova AI, Winstanley EL, et al. Acamprosate in the treatment of binge eating disorder: a placebo-controlled trial. Int J Eat Disord. 2011 Jan;44(1):81-90. Epub: 2010/11/17. PMID: 21080416.
41. McElroy SL, Guerdjikova AI, Blom TJ, et al. A placebo-controlled pilot study of the novel opioid receptor antagonist ALKS-33 in binge eating disorder. Int J Eat Disord. 2013 Apr;46(3):239-45. Epub: 2013/02/06. PMID: 23381803.
42. McElroy SL, Guerdjikova A, Kotwal R, et al. Atomoxetine in the treatment of binge-eating disorder: a randomized placebo-controlled trial. J Clin Psychiatry. 2007 Mar;68(3):390-8. Epub: 2007/03/29. PMID: 17388708.
43. Brownley KA, Von Holle A, Hamer RM, et al. A double-blind, randomized pilot trial of chromium picolinate for binge eating disorder: Results of the Binge Eating and Chromium (BEACh) Study. J Psychosom Res. 2013;75(1):36-42.
44. Tasca G, Ritchie K, Conrad G, et al. Attachment scales predict outcome in a randomized controlled trial of two group therapies for binge eating disorder: An aptitude by treatment interaction. Psychotherapy Research. 2006;16(1):106-21. PMID: 19216230.
45. Dingemans AE, Spinhoven P, van Furth EF. Predictors and mediators of treatment outcome in patients with binge eating disorder. Behav Res Ther. 2007 Nov;45(11):2551-62. Epub: 2007/07/24. PMID: 17643390.
46. Eldredge KL, Stewart Agras W, Arnow B, et al. The effects of extending cognitive-behavioral therapy for binge eating disorder among initial treatment nonresponders. Int J Eat Disord. 1997 May;21(4):347-52. Epub: 1997/05/01. PMID: 9138046.
47. Peterson CB, Mitchell JE, Engbloom S, et al. Group cognitive-behavioral treatment of binge eating disorder: a comparison of therapist-led versus self-help formats. Int J Eat Disord. 1998 Sep;24(2):125-36. Epub: 1998/08/11. PMID: 9697011.
48. Peterson CB, Mitchell JE, Crow SJ, et al. The efficacy of self-help group treatment and therapist-led group

treatment for binge eating disorder. Am J Psychiatry. 2009 Dec;166(12):1347-54. Epub: 2009/11/04. PMID: 19884223.

49. Carrard I, Crepin C, Rouget P, et al. Randomised controlled trial of a guided self-help treatment on the Internet for binge eating disorder. Behav Res Ther. 2011 Aug;49(8):482-91. Epub: 2011/06/07. PMID: 21641580.
50. Carter JC, Fairburn CG. Cognitive-behavioral self-help for binge eating disorder: a controlled effectiveness study. J Consult Clin Psychol. 1998 Aug;66(4):616-23. Epub: 1998/09/15. PMID: 9735577.
51. Grilo CM, White MA, Gueorguieva R, et al. Self-help for binge eating disorder in primary care: a randomized controlled trial with ethnically and racially diverse obese patients. Behav Res Ther. 2013 Dec;51(12):855-61. Epub: 2013/11/06. PMID: 24189569.
52. Grilo CM, Masheb RM. A randomized controlled comparison of guided self-help cognitive behavioral therapy and behavioral weight loss for binge eating disorder. Behav Res Ther. 2005 Nov;43(11):1509-25. Epub: 2005/09/15. PMID: 16159592.
53. Hilbert A, Tuschen-Caffier B. Body image interventions in cognitive-behavioural therapy of binge-eating disorder: a component analysis. Behav Res Ther. 2004 Nov;42(11):1325-39. Epub: 2004/09/24. PMID: 15381441.
54. Le Grange D, Gorin A, Dymek M, et al. Does ecological momentary assessment improve cognitive behavioural therapy for binge eating disorder? A pilot study. European Eating Disorders Review. 2002;10(5):316-28. PMID: 11820730.
55. Ricca V, Castellini G, Mannucci E, et al. Comparison of individual and group cognitive behavioral therapy for binge eating disorder. A randomized, three-year follow-up study. Appetite. 2010 Dec;55(3):656-65. Epub: 2010/09/28. PMID: 20870000.
56. Peterson CB, Mitchell JE, Engbloom S, et al. Self-Help Versus Therapist-Led Group Cognitive-Behavioral Treatment of Binge Eating Disorder at Follow-Up. Int J Eat Disord. 2001;30(4):363-74. PMID: 5527025.
57. Munsch S, Biedert E, Meyer A, et al. A randomized comparison of cognitive behavioral therapy and behavioral weight loss treatment for overweight individuals with binge eating disorder. Int J Eat Disord. 2007 Mar;40(2):102-13. Epub: 2006/11/08. PMID: 17089420.
58. Grilo CM, Masheb RM, Wilson GT, et al. Cognitive-behavioral therapy, behavioral weight loss, and sequential treatment for obese patients with binge-eating disorder: a randomized controlled trial. J Consult Clin Psychol. 2011 Oct;79(5):675-85. Epub: 2011/08/24. PMID: 21859185.
59. Wilson GT, Wilfley DE, Agras WS, et al. Psychological treatments of binge eating disorder. Arch Gen Psychiatry. 2010 Jan;67(1):94-101. Epub: 2010/01/06. PMID: 20048227.
60. Wilfley DE, Welch RR, Stein RI, et al. A randomized comparison of group cognitive-behavioral therapy and group interpersonal psychotherapy for the treatment of overweight individuals with binge-eating disorder. Arch Gen Psychiatry. 2002 Aug;59(8):713-21. Epub: 2002/08/02. PMID: 12150647.
61. Wilfley D, Welch R, Stein R. Group interpersonal psychotherapy may be as effective as group cognitive behavioural therapy for overweight people with binge eating disorder. Evidence Based Mental Health. 2003;6(2):56. PMID: 10074184.
62. De Zwaan M, Mitchell JE, Crosby RD, et al. Short-Term Cognitive Behavioral Treatment Does Not Improve Outcome of a Comprehensive Very-Low-Calorie Diet Program in Obese Women With Binge Eating Disorder. Behav Ther. 2005 Winter2005;36(1):89-99. PMID: 16713407.
63. Safer DL, Robinson AH, Jo B. Outcome from a randomized controlled trial of group therapy for binge eating disorder:

comparing dialectical behavior therapy adapted for binge eating to an active comparison group therapy. Behav Ther. 2010 Mar;41(1):106-20. Epub: 2010/02/23. PMID: 20171332.
64. Safer DL, Joyce EE. Does rapid response to two group psychotherapies for binge eating disorder predict abstinence? Behav Res Ther. 2011 May;49(5):339-45. Epub: 2011/04/05. PMID: 21459363.
65. Robinson AH, Safer DL. Moderators of dialectical behavior therapy for binge eating disorder: results from a randomized controlled trial. Int J Eat Disord. 2012 May;45(4):597-602. Epub: 2011/04/19. PMID: 21500238.
66. Riva G, Bacchetta M, Baruffi M, et al. Virtual-reality-based multidimensional therapy for the treatment of body image disturbances in binge eating disorders: a preliminary controlled study. IEEE Trans Inf Technol Biomed. 2002 Sep;6(3):224-34. Epub: 2002/10/17. PMID: 12381039.
67. Cesa GL, Manzoni GM, Bacchetta M, et al. Virtual reality for enhancing the cognitive behavioral treatment of obesity with binge eating disorder: randomized controlled study with one-year follow-up. J Med Internet Res. 2013;15(6):e113. Epub: 2013/06/14. PMID: 23759286.
68. Castelnuovo G, Manzoni GM, Villa V, et al. Brief Strategic Therapy vs Cognitive Behavioral Therapy for the Inpatient and Telephone-Based Outpatient Treatment of Binge Eating Disorder: The STRATOB Randomized Controlled Clinical Trial. Clin Pract Epidemiol Ment Health. 2011;7:29-37. Epub: 2011/05/12. PMID: 21559234.
69. Laederach-Hofmann K, Graf C, Horber F, et al. Imipramine and diet counseling with psychological support in the treatment of obese binge eaters: a randomized, placebo-controlled double-blind study. Int J Eat Disord. 1999 Nov;26(3):231-44. Epub: 1999/08/11. PMID: 10441239.
70. Devlin MJ, Goldfein JA, Petkova E, et al. Cognitive behavioral therapy and fluoxetine as adjuncts to group behavioral therapy for binge eating disorder. Obes Res. 2005 Jun;13(6):1077-88. Epub: 2005/06/25. PMID: 15976151.
71. Claudino AM, de Oliveira IR, Appolinario JC, et al. Double-blind, randomized, placebo-controlled trial of topiramate plus cognitive-behavior therapy in binge-eating disorder. J Clin Psychiatry. 2007 Sep;68(9):1324-32. Epub: 2007/10/06. PMID: 17915969.
72. Grilo CM, Masheb RM, Salant SL. Cognitive behavioral therapy guided self-help and orlistat for the treatment of binge eating disorder: a randomized, double-blind, placebo-controlled trial. Biol Psychiatry. 2005 May 15;57(10):1193-201. Epub: 2005/05/04. PMID: 15866560.
73. Grilo CM, White MA. Orlistat with behavioral weight loss for obesity with versus without binge eating disorder: Randomized placebo-controlled trial at a community mental health center serving educationally and economically disadvantaged Latino/as. Behav Res Ther. 2013;51(3):167-75. PMID: 85397433.
74. Golay A, Laurent-Jaccard A, Habicht F, et al. Effect of orlistat in obese patients with binge eating disorder. Obes Res. 2005 Oct;13(10):1701-8. Epub: 2005/11/16. PMID: 16286517.
75. Boutelle KN, Zucker NL, Peterson CB, et al. Two novel treatments to reduce overeating in overweight children: a randomized controlled trial. J Consult Clin Psychol. 2011 Dec;79(6):759-71. Epub: 2011/11/30. PMID: 22122291.
76. Jones M, Luce KH, Osborne MI, et al. Randomized, controlled trial of an internet-facilitated intervention for reducing binge eating and overweight in adolescents. Pediatrics. 2008 Mar;121(3):453-62. Epub: 2008/03/04. PMID: 18310192.
77. Tanofsky-Kraff M, Wilfley DE, Young JF, et al. A pilot study of interpersonal

psychotherapy for preventing excess weight gain in adolescent girls at-risk for obesity. Int J Eat Disord. 2010 Dec;43(8):701-6. Epub: 2009/11/03. PMID: 19882739.
78. Agras WS, Telch CF, Arnow B, et al. One-year follow-up of cognitive-behavioral therapy for obese individuals with binge eating disorder. J Consult Clin Psychol. 1997 Apr;65(2):343-7. Epub: 1997/04/01. PMID: 9086701.
79. Maxwell H, Tasca GA, Ritchie K, et al. Change in attachment insecurity is related to improved outcomes 1-year post group therapy in women with binge eating disorder. Psychotherapy. 2014;51(1):57-65.
80. Castellini G, Mannucci E, Lo Sauro C, et al. Different moderators of cognitive-behavioral therapy on subjective and objective binge eating in bulimia nervosa and binge eating disorder: a three-year follow-up study. Psychother Psychosom. 2012;81(1):11-20. Epub: 2011/11/26. PMID: 22116257.
81. Fichter MM, Quadflieg N, Brandl B. Recurrent overeating: An empirical comparison of binge eating disorder, bulimia nervosa, and obesity. Int J Eat Disord. 1993;14(1):1-16.
82. Fichter MM, Quadflieg N, Rehm J. Predicting the outcome of eating disorders using structural equation modeling. Int J Eat Disord. 2003 Nov;34(3):292-313. Epub: 2003/09/02. PMID: 12949921.
83. Fichter MM, Quadflieg N, Hedlund S. Long-term course of binge eating disorder and bulimia nervosa: relevance for nosology and diagnostic criteria. Int J Eat Disord. 2008 Nov;41(7):577-86. Epub: 2008/05/14. PMID: 18473335.
84. Linna MS, Raevuori A, Haukka J, et al. Reproductive health outcomes in eating disorders. Int J Eat Disord. 2013 Dec;46(8):826-33. Epub: 2013/09/03. PMID: 23996114.
85. Preti A, Rocchi MB, Sisti D, et al. A comprehensive meta-analysis of the risk of suicide in eating disorders. Acta Psychiatr Scand. 2011 Jul;124(1):6-17. Epub: 2010/11/26. PMID: 21092024.
86. White MA, Kalarchian MA, Masheb RM, et al. Loss of control over eating predicts outcomes in bariatric surgery patients: a prospective, 24-month follow-up study. J Clin Psychiatry. 2010 Feb;71(2):175-84. Epub: 2009/10/27. PMID: 19852902.
87. Eisenberg ME, Neumark-Sztainer D. Friends' dieting and disordered eating behaviors among adolescents five years later: findings from Project EAT. J Adolesc Health. 2010 Jul;47(1):67-73. Epub: 2010/06/16. PMID: 20547294.
88. Neumark-Sztainer D, Wall M, Larson NI, et al. Dieting and disordered eating behaviors from adolescence to young adulthood: findings from a 10-year longitudinal study. J Am Diet Assoc. 2011 Jul;111(7):1004-11. Epub: 2011/06/28. PMID: 21703378.
89. Goldschmidt AB, Wall MM, Loth KA, et al. The course of binge eating from adolescence to young adulthood. Health Psychol. 2014 May;33(5):457-60. Epub: 2013/08/28. PMID: 23977873.
90. Sonneville KR, Horton NJ, Micali N, et al. Longitudinal associations between binge eating and overeating and adverse outcomes among adolescents and young adults: Does loss of control matter? JAMA Pediatrics. 2013;167(2):149-55.
91. Field AE, Sonneville KR, Micali N, et al. Prospective association of common eating disorders and adverse outcomes. Pediatrics. 2012;130(2):e289-e95.
92. Hilbert A, Hartmann AS, Czaja J, et al. Natural course of preadolescent loss of control eating. J Abnorm Psychol. 2013 Aug;122(3):684-93. Epub: 2013/09/11. PMID: 24016009.
93. Hilbert A, Brauhardt A. Childhood loss of control eating over five-year follow-up. Int J Eat Disord. 2014 Jun 5Epub: 2014/06/06. PMID: 24899359.
94. Hay PP, Bacaltchuk J, Stefano S, et al. Psychological treatments for bulimia nervosa and binging. Cochrane Database Syst Rev. 2009(4):CD000562. Epub: 2009/10/13. PMID: 19821271.

95. Reas DL, Grilo CM. Review and meta-analysis of pharmacotherapy for binge-eating disorder. Obesity (Silver Spring). 2008 Sep;16(9):2024-38. Epub: 2009/02/03.
96. Devlin MJ, Goldfein JA, Petkova E, et al. Cognitive behavioral therapy and fluoxetine for binge eating disorder: two-year follow-up. Obesity (Silver Spring). 2007 Jul;15(7):1702-9. Epub: 2007/07/20. PMID: 17636088.
97. Grilo CM, Wilson GT, Crosby RD, et al. 12-Month Follow-Up of Fluoxetine and Cognitive Behavioral Therapy for Binge Eating Disorder. J Consult Clin Psychol. 2012;80(6):1108-13. PMID: 83916642.
98. Bardone-Cone AM, Harney MB, Maldonado CR, et al. Defining recovery from an eating disorder: Conceptualization, validation, and examination of psychosocial functioning and psychiatric comorbidity. Behav Res Ther. 2010 Mar;48(3):194-202. PMID: 19945094.

Introduction

Background

Definition of Binge-Eating Disorder

Binge-eating disorder (BED) is characterized by recurrent episodes of binge eating (i.e., eating episodes that occur in a discrete period of time [≤2 hours] and involve the consumption of an amount of food that is definitely larger than most people would consume under similar circumstances). Other core features of BED are a sense of lack of control over eating during binge episodes, significant psychological distress (e.g., shame, guilt) about binge eating, and the absence of recurrent inappropriate compensatory behaviors.

In May 2013, the American Psychiatric Association (APA) recognized BED as a distinct eating disorder in the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5).[1] Previously (in the DSM-IV), BED had been designated as a provisional diagnosis in need of further study for two main reasons: the literature on BED was insufficient in size and scope and the available tools for measuring and diagnosing the syndrome in clinical and community settings were too inconsistent to consider BED a distinct eating disorder. The provisional diagnostic criteria gave clinicians and researchers a working definition of BED with a common language they could use for studying BED.

Table 1 presents the DSM-IV and DSM-5 diagnostic criteria for BED and also provides definitions for "loss-of-control" (LOC) eating, which is described in more detail below. In the shift from provisional to formal diagnosis for BED itself, APA experts changed the criteria for frequency and duration of BED based on the expanded peer-reviewed literature. Specifically, the frequency criterion was reduced from twice per week to once per week and the duration criterion was reduced from 6 months to 3 months, bringing the criteria in line with those for bulimia nervosa (BN).

Experts expect that the shift from provisional to formal diagnosis will facilitate reimbursement for clinicians and insurance coverage for patients. In addition, the change in frequency and duration criteria may result in more individuals being diagnosed with BED (i.e., individuals previously labeled as having "subthreshold" BED because their binge-eating frequency or duration was below criterion levels will now meet full diagnostic criteria). In a study of more than 13,000 adult females in Sweden, the BED lifetime prevalence estimate increased linearly as the binge frequency criterion decreased.[2] Similarly, the percentage of bariatric surgery patients diagnosed with BED increased by 3.4 percent when using DSM-5 compared with DSM-IV criteria.[3] In this review, we highlight which of the two definitions of BED investigators used in individual studies to examine whether any differences affected outcomes.

Table 1. DSM-IV and DSM-5 diagnostic criteria for Binge-Eating Disorder and frequently used definitions of Loss-Of-Control eating

Disorder or Behavior	Criteria
DSM-IV[4] and DSM-5[1] Criteria for BED	1. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following: a. Eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat in a similar period of time under similar circumstances b. The sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what or how much one is eating) 2. Binge-eating episodes are associated with three (or more) of the following: a. Eating much more rapidly than normal b. Eating until feeling uncomfortably full c. Eating large amounts of food when not feeling physically hungry d. Eating alone because of being embarrassed by how much one is eating e. Feeling disgusted with oneself, depressed, or very guilty after overeating 3. Marked distress regarding binge eating is present 4. The binge eating occurs, on average, a. at least 2 days a week for 6 months (DSM-IV frequency and duration criteria) b. at least 1 day a week for 3 months (DSM-5 frequency and duration criteria) 5. The binge eating is not associated with the regular use of inappropriate compensatory behavior (e.g., purging, fasting, excessive exercise) and does not occur exclusively during the course of anorexia nervosa or bulimia nervosa DSM-IV does not include a BED severity grading scale. Applicable to DSM-5 only, BED severity is graded as follows: Mild: 1 to 3 episodes per week Moderate: 4 to 7 episodes per week Severe: 8 to 13 episodes per week Extreme: 14 or more episodes per week
Loss-of-Control Eating	No standardized definition exists for LOC eating; however, parameters commonly used to describe and quantify LOC eating include the following: 1. The presence of (an) objective binge-eating episode(s) (OBEs), whereby BED DSM criteria 1a and 1b above are met, *and/or* 2. The presence of (a) subjective binge-eating episode(s) (SBEs), whereby the amount of food consumed is not unambiguously large (as judged by the interviewer/assessor) but the patient views it as excessive and reports loss of control during such episodes; that is, BED DSM criterion 1b but not 1a is met, *and/or* 3. The presence of (a) subjective episode(s) of LOC over eating among bariatric surgery patients, including engaging in eating behaviors that might be contraindicated after surgery.

BED = binge-eating disorder; DSM = *Diagnostic and Statistical Manual of Mental Disorders*; LOC = loss of control; OBE = objective binge-eating episode; SBE = subjective binge-eating episode.

Prevalence of Binge-Eating Disorder

In the United States, the prevalence of BED among adults is approximately 3.5 percent in women and approximately 2 percent in men[5] based on DSM-IV criteria; it may be slightly higher based on DSM-5 criteria.[2,6] In a recent community-based World Health Organization survey of more than 24,000 adults older than 18 years of age living in 14 mostly upper-middle and high-

income countries, the lifetime prevalence ranged from 0.2 percent to 4.7 percent; the United States had the second highest prevalence (2.6 percent) overall.[7] BED is more common (as high as 30 percent) among obese individuals,[8,9] and, it is more prevalent among Hispanic populations than among other groups defined by race or ethnicity.[10,11]

BED is typically first diagnosed in young adulthood (early to mid-20s), and symptoms often persist well beyond midlife.[12-14] The general course of illness sometimes includes crossover to and from other eating disorders such as BN and anorexia nervosa.[6,15,16] BED is associated with significant role impairment[7] and relationship dissatisfaction;[17] it is considered a significant public health problem independently as well as for its impact on chronic pain, other psychiatric disorders, obesity, and diabetes.[18-20]

Definition of Loss-Of-Control Eating

LOC eating is not a formal diagnosis. Rather, it refers to recurrent binge-like eating behavior in individuals for whom diagnosis of threshold BED is challenging, such as bariatric surgery patients and children. After bariatric surgery, the gut size and capacity are significantly reduced, effectively rendering it physically impossible for patients to consume an atypically large amount of food. Children may not meet the BED criterion of consuming an atypically large amount because their parents or others limit the quantity of food they consume or they are unable to provide accurate quantification of the amount they eat. Table 1 provides working definitions of LOC eating.

Prevalence of Loss-Of-Control Eating

The prevalence of LOC eating is unknown. In postbariatric surgery patients, it may be as high as 25 percent.[21,22] In children at risk for adult obesity, because of either their own overweight (body mass index [BMI] at or above the 95th percentile) or that of their parents (BMI greater than 25 kg/m^2), prevalence may be as high as 32 percent.[23] Adolescents who identify as lesbian or gay are 2.1 and 7.2 times, respectively, more likely to report LOC eating than their heterosexual counterparts.[24]

LOC eating has detrimental psychological and physical health effects,[23,25,26] including significant distress and symptoms of depression,[27] excess weight gain in children, and suboptimal weight loss and weight regain in postbariatric surgery patients.[28] As bariatric surgeries have become more commonplace in the treatment of severe obesity, clinical observations suggest that persistent binge eating as a continuation of presurgical BED or as de novo LOC eating subsequent to bariatric surgery may be an important risk factor for poorer outcomes; these may include less initial excess weight loss and impaired quality of life.[25,26,29,30]

Current Challenges and Controversies in Diagnosing These Conditions

In making a diagnosis of BED, assessing whether a patient is eating an atypically large amount of food is not wholly quantitative. Rather, diagnosis requires the clinician's evaluation of the patient's self-report and is, therefore, at risk for detection bias. Nevertheless, assessment by a structured clinical interview is considered the gold standard. The most widely used and accepted interview methods include the Structured Clinical Interview for DSM Disorders (SCID),[1,31] the Eating Disorder Examination (EDE),[32] and the Structured Interview for Anorexic and Bulimic Syndromes (SIAB-EX).[33] For this review, we included only studies in which participants were

identified as meeting DSM-IV or -5 criteria for BED as determined through a structured interview. The instruments that may be used to make these diagnoses, along with other tools used to assess BED-related psychopathology, are described in Table 2.

Table 2. Common diagnostic and outcome measures used in the included trials

Abbreviated Name	Complete Name	Description of Instrument and Subscales	Improvement Indicated by
BAI	Beck Anxiety Inventory[34]	21-item self-report multiple choice questionnaire about common symptoms of anxiety (numbness, sweating, fear)	Decrease
BDI	Beck Depression Inventory[35]	21-item self-report multiple choice questionnaire about common emotional (irritability, hopelessness, guilt) and physical (fatigue, weight loss) symptoms of depression	Decrease
BES	Binge Eating Scale[36]	Self-report measure of binge eating severity as measured by loss of control over eating behavior; 8 items on behavioral manifestations, 8 items on feelings and cognitions	Decrease
BIS	Barratt Impulsiveness Scale[37]	30-item self-report questionnaire about impulsiveness in various domains such as attention and self-control	Decrease
BSI	Brief Symptom Inventory[38,39]	Brief self-report instrument to assess 9 dimensions of psychiatric problems (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, psychoticism)	Decrease
BSQ	Body Shape Questionnaire[32]	Self-report inventory to measure worries about weight and body shape	Decrease
CGI	Clinical Global Impressions - Improvement[40]	Clinician-rated scale to assess treatment response in psychiatric patients; 3 subscales: severity of illness (CGI-S), global improvement (CGI-I), efficacy index (CGI-EI)	Decrease Increase
EAT	Eating Attitudes Test[41]	Standardized self-report measure of symptoms and concern characteristics of eating disorders; 2 versions: EAT-26, EAT-40	Decrease
EDO	Eating Disorders in Obesity[42]	Self-report measure to assess DSM-IV criteria for eating disorders in weight loss treatment patients; cannot be used to diagnose BED because it does not assess marked distress or impairment	Decrease
EDE[a]	Eating Disorder Examination[43]	Semistructured interview to measure specific psychopathology of eating disorders; 4 subscales: dietary restraint, eating concern, weight concern, shape concern	Decrease
EDE-Q	Eating Disorder Examination - Questionnaire[44]	Self-report assessment of thoughts and behaviors commonly found in eating disorders; 4 subscales: dietary restraint, eating concern, weight concern, shape concern; assesses behaviors over the past 28 days	Decrease
EDI	Eating Disorder Inventory[45]	Standardized self-report measure of psychiatric symptoms commonly associated with AN, BN, or other eating disorders; also included scales for asceticism, impulse regulation, and social insecurity; version 3 has 91 items	Decrease
FCI	Food Craving Inventory[46]	Self-report questionnaire that measures cravings for different foods and generates a total scores and 4 subscales: high fats, sweets, carbohydrates/starches, fast-food fats	Decrease

Table 2. Common diagnostic and outcome measures used in the included trials (continued)

Abbreviated Name	Complete Name	Description of Instrument and Subscales	Improvement Indicated by
HADS	Hospital Anxiety and Depression Scale[47]	14-item self-report questionnaire that measures common symptoms such as anxiety and depression such as feeling tense, having worry thoughts, and loss of enjoyment	Decrease
HAM-A	Hamilton Anxiety Scale[48]	Semistructured interview to assess severity of anxiety symptomatology	Decrease
HAM-D or HDRS or HRSD	Hamilton Depression Rating Scale[49]	Semistructured interview to assess an array of behavioral, affective, and vegetative symptoms of depression	Decrease
IIP	Inventory of Interpersonal Problems[50]	Instrument to measure interpersonal problems and level of distress arising from interpersonal sources	Decrease
IWQOL	Impact of Weight on Quality of Life Questionnaire[51]	Questionnaire designed to assess the effects of obesity on health-related quality of life (QOL); five subscales that address QOL as it relates to physical function, self-esteem, sexual life, public distress, and work	Increase
MADRS	Montgomery-Åsberg Depression Rating Scale[52]	10-item questionnaire about common symptoms of depression such as sadness, tension, sleep and concentration difficulties, and suicidal thoughts	Decrease
QEWP-R	Questionnaire of Eating and Weight Patterns–Revised[53]	Self-report questionnaire to assess a range of features and problems associated with obesity and eating disorders	Decrease
RSE	Rosenberg Self-Esteem Scale[54]	A widely used 10-item questionnaire that assesses one's sense of self-worth, pride, failure, self-satisfaction, and self-respect	Increase
SF-36	36-Item Short Form Health Survey[55,56]	Self-report questionnaire to assess health-related quality of life; 8 subscales: physical function, role physical, bodily pain, general health, mental health, role emotional, social function, vitality; 2 composite scores: physical health; mental health. Also exists in a 12-item form	Increase
SCID-I[a]	Structured Clinical Interview for DSM-IV Axis I Disorders[57]	Semistructured interview for making the major DSM-IV Axis I diagnoses; facilitates the assessment of all criteria for BED in interview form	Decrease
SCL-90-R	Symptom Checklist- 90-Revised[39]	General measure of psychopathology, including various forms of anxiety, depression, paranoia, psychotic features. Subscales: Global Severity Index to measure overall psychological distress; Positive Symptom Distress Index to measure the intensity of symptoms; Positive Symptom Total of number of self-reported symptoms (somatization, obsessive-compulsive, interpersonal sensitivity, depression, hostility, phobic anxiety, paranoid ideation, psychoticism)	Decrease
SDS	Sheehan Disability Scale[58,59]	Consists of three self-rated items that measure the extent of impairment in work, social, and family life due to panic, anxiety, phobic, or depressive symptoms	Decrease

Table 2. Common diagnostic and outcome measures used in the included trials (continued)

Abbreviated Name	Complete Name	Description of Instrument and Subscales	Improvement Indicated by
SIAB-EX[a]	Structured Interview for Anorexic and Bulimic Syndromes[33]	Interview to assess severity of current eating disorder symptoms; 6 subscales: body image and ideal of slimness, social integration and sexuality, depression, obsessive compulsive syndromes and anxiety, bulimic symptoms, laxative abuse. Can be used to determine DSM-IV BED diagnosis based on an established algorithm	Decrease
STAI	State–Trait Anxiety Inventory[60,61]	Standardized self-report assessment of both state and trait anxiety (2 subscales)	Decrease
TFEQ	Three Factor Eating Questionnaire[62]	Self-report inventory; 3 subscales: Cognitive-Restraint, Hunger, Disinhibition. Also known as the Eating Inventory	Decrease
YBOCS	Yale-Brown Obsessions and Compulsions Scale[63,64]	Clinician-rated scale with separate subtotals for severity of obsessions and compulsions; 2 subscales: obsessions, compulsions	Decrease

[a] Can be used to diagnose BED

AN= anorexia nervosa; BED = binge-eating disorder; BN= bulimia nervosa; DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders,* 4th edition; QOL = quality of life.

Assessing BED and LOC eating in children poses unique challenges, in part because neither the DSM-IV nor DSM-5 established a minimum age for a diagnosis of BED. As a result, when diagnosing adolescents, some clinicians consider BED criteria and others consider LOC eating criteria. Typically, the term *LOC eating* is more consistently used when focusing on preadolescents or younger children who may not meet the BED criterion of consuming an atypically large amount because their parents or others limit the quantity of food they consume or they have difficulty quantifying the amount eaten. LOC eating has no consistently endorsed definition, and assessment techniques lack standardization. For this review, using input from our Technical Expert Panel (TEP), we included studies of LOC eating in children ages 6 years or older. We set this lower age limit partly to avoid capturing studies of infant feeding in our literature searches; it is consistent with the direct experience of one of our TEP members in assessing LOC eating by questionnaire in children as young as 6 years old.

In the postbariatric setting, the definition of LOC eating is not straightforward, and the assessment of LOC eating also lacks standardization but for different reasons than in children. The definition is not straightforward because some patients may report their disordered eating behaviors as a general *subjective* sense of lack of control over their eating rather than in terms of specific overconsumption based on the amount of food. Also, LOC eating may manifest in the consumption of food types and patterns of intake that are contraindicated after surgery, so the lack of control is over adherence to the recommended nutritional plan. Using TEP input, for this review we included studies that measured both subjective and objective LOC eating; including subjective LOC eating as an outcome permitted us to examine nonstandardized detrimental eating behaviors that are relevant to the well-being of postbariatric surgery patients.

Current Challenges and Controversies in Treating These Disorders

Current Treatment Options for Binge-Eating Disorder

Treatment for BED includes various approaches that target the core behavioral features (binge eating) and psychological features (i.e., eating, weight, and shape concerns; distress) of this condition. Other important targets of treatment include metabolic health (in patients who are obese, diabetic, or both) and mood regulation (in patients with coexisting depression or anxiety, for example). Commonly used approaches are described in Table 3.

Table 3. Treatments commonly used for BED

Intervention Type	Treatment	Description
Psychological or behavioral	Cognitive behavioral therapy (CBT)	A form of psychotherapy that focuses on identifying relations among thoughts, feelings, and behaviors, aiming to change negative thoughts about oneself and the world and, by doing so, reduce negative emotions and undesirable behavior patterns. Variations exist in how CBT is delivered including therapist-led individual and group sessions, self-help, and guided self-help.
Psychological or behavioral	Dialectical behavioral therapy	A specific form of behavioral therapy that focuses on increasing mindfulness and developing skills to improve emotion regulation, distress tolerance, and interpersonal relationships to help patients respond to stress and negative affect more effectively.
Psychological	Interpersonal psychotherapy	A form of psychotherapy that focuses on the role of interpersonal functioning in causing and maintaining negative mood, psychological distress, and unhealthy behaviors.
Behavioral	Behavioral weight loss	Treatment that incorporates various behavioral strategies to promote weight loss, such as caloric restriction and increased physical activity.
Pharmacological	Second-generation and tricyclic antidepressants	A class of medications that works by selectively inhibiting reuptake of neurotransmitters involved in the regulation of mood and appetite (i.e., dopamine, norepinephrine, and serotonin). Common examples include bupropion, citalopram, desipramine, duloxetine, fluoxetine, and sertraline, which are indicated for treating patients with depression.
Pharmacological	Anticonvulsants	A class of medications indicated for the treatment of epilepsy, bipolar disorder, major depression, and migraines. The most commonly used one, topiramate, is a carbonic anhydrase inhibitor.
Pharmacological	Antiobesity	Medications used to treat obesity. One example is orlistat, which inhibits pancreatic lipase thereby decreasing fat absorption in the gut.

CBT = cognitive behavioral therapy.

Psychological and behavioral approaches include cognitive behavioral therapy (CBT),[65-74] interpersonal psychotherapy,[75-77] dialectical behavior therapy,[78,79] and behavioral weight loss.[68,80,81] Currently, no medications have a specific indication for BED approved by the U.S. Food and Drug Administration; however, numerous medications are used off-label in the clinical management of BED. Among the classes of medications most commonly used are antidepressants[82-92] (specifically, second-generation antidepressants, most commonly selective serotonin reuptake inhibitors [SSRIs] and anticonvulsants).[91,93]

Three recent meta-analyses addressed the benefits of treatment across broad categories of approaches (i.e., pharmacotherapy consisting of antidepressants;[94] pharmacotherapy consisting of antidepressants, anticonvulsants, antiobesity agents, and other medications;[95,96] and psychotherapy[96]). These meta-analyses included data from nonrandomized and randomized trials and single-arm studies using a variety of study designs (e.g., open-label, single-blind, and double-blind). For this review, we compared the findings from the two systematic reviews that

focused on randomized controlled trials and searched for additional evidence that would allow us to expand or refine them and to address, through further meta-analyses, the efficacy of *specific* approaches. We also expanded the evidence base by including any new studies of alternative or novel approaches published since the prior systematic review of managing eating disorders from the Agency for Healthcare Research and Quality (AHRQ);[97] for example, we searched for studies using complementary and alternative medicine and dietary interventions, among others.

Currently available treatment options all have relative advantages and disadvantages. Pharmacological interventions have negative physical side effects. For example, antidepressants and anticonvulsants are commonly associated with diarrhea, dizziness, dry mouth, fatigue, sexual dysfunction, and somnolence, which can interfere with treatment compliance.[98-100] But pharmacological treatment may be more easily accessible than psychological and behavioral interventions that require access to practitioners with specialized training in BED. Individuals living in geographically remote areas may be especially disadvantaged with limited access to specialized care providers. In addition, most psychological treatments are relatively lengthy (approximately 16 to 20 weeks) and are thus less scalable, which limits the extent to which these treatments can be widely disseminated to more generalist practices. We address not only benefits but also harms and costs associated with treatment and their impact on treatment dropout.

Current Treatment Options for Loss-Of-Control Eating

Treatments for LOC eating for postbariatric surgery patients and children reflect the treatment options described above for BED. Family-based treatments have proven effective in treating children with anorexia nervosa,[101] so theoretically they may be of interest for BED and LOC eating as well. To date, no treatments specifically addressing LOC eating have been developed.

Existing Clinical Practice Guidelines for Treating Patients with Binge-Eating Disorder or Loss-Of-Control Eating

The APA,[102] the National Institute for Health and Clinical Excellence (NICE) in the United Kingdom,[103] the Task Force on Eating Disorders of the World Federation of Societies of Biological Psychiatry,[104] and the American Dietetic Association (now the Academy of Nutrition and Dietetics)[105] have issued treatment recommendations for BED. Generally, these strongly support use of CBT and SSRIs but give less strong support for other psychological, behavioral, and pharmacological approaches.

Recommendations differ markedly about the manner and timing with which treatment is offered. First, the APA recommends that CBT be incorporated into a team approach (including psychiatrists, psychologists, dietitians, and social workers); by contrast, NICE recommends that treatment begin with a course of CBT-based self-help that is followed, if necessary for nonresponders, by CBT adapted specifically for BED. Second, within the APA's recommended team approach, medication is considered as adjunctive therapy; whereas, the NICE guidelines indicate that medication monotherapy may be sufficient treatment for a subset of patients. Third, because of very limited data on efficacy, there is minimal support (only from the APA) for non-weight-directed psychosocial approaches (i.e., Health at Every Size [HAES], Overeaters Anonymous) and nutritional approaches, although the latter approaches are consistent with the American Dietetic Association's endorsement of nutrition counseling by a registered dietitian to support health-centered behaviors rather than weight-centered dieting. The organizations do

agree, however, that the long-term effects of SSRIs are unknown. Our previous AHRQ review highlighted this gap in knowledge and the need for additional studies on novel agents and approaches in more diverse patient samples.[97]

Considerable uncertainty surrounds the question of which treatment(s) is best suited for a particular patient; efficacy needs to be understood as a function of the presence or level of coexisting psychopathology, metabolic complications, or other physical or psychiatric conditions.[106] Patients enter treatment for BED with varying levels of concern about body shape and weight; they also seek treatment having different levels of health care insurance. These factors can strongly influence choice of first-line treatment; formulation of a comprehensive treatment plan; and, ultimately, treatment outcome. In addition, individuals with BED seeking bariatric surgery can be denied coverage for their surgery even though no evidence base exists indicating that patients with BED may have poorer outcomes from surgery than those without BED.[107] Thus, considerable clinical and policy interest exists in understanding BED as a negative prognostic indicator for bariatric surgery, the extent to which nonsurgical interventions (e.g., psychotherapy) for BED may be beneficial in reducing or preventing LOC eating after surgery, and the appropriate timing of these nonsurgical interventions (before or after surgery).

In addition, federal legislation enacted since the previous AHRQ review established or improved parity for mental health services relative to services for physical health and increased access to health insurance.[108] The 2008 Mental Health Parity and Addiction Equity Act required insurers offering mental health and substance use disorder benefits to provide coverage comparable to that for general medical and surgical care. Subsequently, the 2010 Patient Protection and Affordable Care Act, which took effect in 2014, is making health insurance more accessible for previously uninsured or underinsured Americans. Nonetheless, the impact of these laws on access to treatment options for BED or LOC eating is yet to be determined.

Children and adolescents with LOC eating are presenting for treatment and, in increasing numbers, for bariatric surgery. Also, patients are entering treatment using over-the-counter products and dietary supplements with known or suspected effects on appetite, mood, and weight regulation. These scenarios pose additional challenges for providers evaluating treatment options, but currently no guidelines are tailored to the specific needs of these subgroups. We addressed the need for evidence regarding individual factors that influence treatment outcome by examining efficacy in subgroups defined by factors such as age, sex, race, and ethnicity.

Additional Considerations or Questions about Treatment for Patients with These Disorders

Many BED patients initially seek and obtain treatment through primary care physicians, who may be able to offer only a limited number of treatment options directly (usually just pharmacotherapy), or through referral to psychologists, dietitians, and psychiatrists, who may also lack specific expertise in BED or (especially) LOC eating. Whether treatment protocols that are used in research studies and that require clinically trained personnel with expertise in BED-specific interventions can be delivered effectively in more commonly available frontline settings is largely unknown. Some untapped areas of interest include stepped-care models and treatment efficacy in residential settings. In this review, we describe treatment settings and delivery methods and report, to the extent possible, their impact on treatment outcomes.

Commonly, along with achieving binge abstinence and reducing distress, weight reduction and improved metabolic health have been key outcomes in BED treatment studies and important treatment goals in clinical settings. Recently, however, some advocates, including the HAES

group (http://www.haescommunity.org/resources.php), have strongly endorsed removing weight-based outcomes in caring for patients with BED while emphasizing greater body acceptance and intuitive eating. Intuitive eating is an approach to healthy weight that focuses on increasing one's awareness of hunger signals and eating only when hungry. HAES maintains that weight-loss interventions are not only ineffective for treating BED patients but are also detrimental because they contribute to the development and perpetuation of disordered eating behavior and psychopathology (restrictive eating, food and body preoccupation, yo-yo weight cycles, reduced self-esteem) and to weight stigmatization and discrimination. Weight stigma awareness is also a central issue of another advocacy group, the Binge-Eating Disorder Association (http://bedaonline.com/binge-eating-disorder-blog/#.Up9vItIwldw). In light of these stakeholder perspectives, the current report includes traditional weight-related outcomes and, when available, nontraditional, non-weight-focused body image and eating behavior outcomes and interventions.

Rationale for This Evidence Review

Previous systematic reviews have addressed psychological treatments for BN and BED (2009),[109] self-help and guided self-help for eating disorders (2006),[110] and management of eating disorders including BED (the AHRQ review, 2006).[97] The authors of the 2006 AHRQ review were unable to draw definitive conclusions concerning the best treatment choices for BED because many of the available treatments had been evaluated in only single studies with small sample sizes or too few studies of sufficient quality.[97] Since that report appeared (see also Brownley et al., 2007[111]), the literature on treatment of BED has expanded, the diagnostic criteria have changed, and a greater interest in BED and LOC eating in bariatric patients and children has emerged. These factors underscored the need for the current systematic review that captures the new information and presents it in a format that can bridge the old and new diagnostic criteria; doing this should improve understanding of BED and LOC eating across the lifespan and clarify factors that influence the progression, maintenance, and resolution of these conditions. This review is not considered an update of the AHRQ review on *Management of Eating Disorders* [97] because we include as our population of interest individuals with BED meeting either the DSM-IV definition (as in the earlier review) or the new DSM-5 definition. We also newly include individuals with LOC eating.

Scope and Key Questions

This review is designed, first, to address the effectiveness of the interventions described above for individuals meeting DSM-IV or DSM-5 criteria for BED, for children with LOC eating, and for postbariatric surgery patients with LOC eating. We had a secondary interest in examining whether treatment effectiveness differed in subgroups based on sex, race, ethnicity, sexual orientation, BMI, duration of illness, or coexisting conditions. Given advice from TEP members, we did not attempt to review studies related to the genetics of BED because genetic risk factors for BED are as yet unknown. We placed few limitations on our review in order to be as inclusive as possible of the available literature.

Broadly, we included in this review psychological, behavioral, pharmacological, and combination interventions. We considered their efficacy with respect to physical and psychological health outcomes across four major categories: (1) binge-eating behavior (binge eating or LOC eating), (2) eating-related psychopathology (e.g., weight and shape concerns, dietary restraint), (3) weight-related, (4) general psychopathology (e.g., depression, anxiety) and (5) other outcomes of interest including metabolic health such as diabetes, quality of life, health

care costs, social and occupational functioning, harms of treatment, and intermediate factors associated with the primary health outcomes such as blood levels of hormones associated with obesity and appetite regulation.

A third aim of this review was to examine the course of illness of BED and of LOC eating, especially as they relate to the primary outcomes. At the population level, diagnostic stability is low for all eating disorders, and within-patient diagnostic cross-over is not uncommon, including BED to BN, for example. Given the recent inclusion of BED as a distinct diagnosis in the DSM-5, it is important to obtain a better understanding of the course of illness in BED, particularly given its relatively high comorbidity with other medical conditions. In addition, there is considerable clinical interest in understanding whether LOC eating is a reliable predictor of poorer weight outcomes and new-onset BED over time. However, little is known about the temporal stability of BED in the community, generally, and of LOC in postbariatric surgery patients and children, specifically. Increasing knowledge of BED and LOC course of illness would help inform the consolidation and concentration of early detection and prevention efforts to reduce these eating difficulties and their potentially deleterious effects on physical health outcomes.

The impetus for this review was primarily the continuing uncertainty about efficacy, harms, and long-term outcomes of common therapies for BED. Moreover, voids in knowledge regarding the course of illness of BED were another motivation for the review. In addition, novel approaches have become more popular since the previous EPC systematic review. Second, glaring gaps in knowledge about both treatment and course of illness related to LOC eating in children and postbariatric surgery patients have become more important in clinical circles. Clinicians and patients who are faced with these uncertainties need better guidance.

In sum, as reflected in our Key Questions (KQs) and analytic frameworks, we aim to increase knowledge about treatment efficacy, to determine whether efficacy varied because of any particular patient characteristic(s), and to describe the course of BED and LOC over time. Ultimately, the information produced in this review is intended to contribute to improved care for patients, better decisionmaking capacity for clinicians, and more sophisticated policies from those responsible for establishing treatment guidelines or making various insurance and related decisions.

Key Questions

The authors from the RTI International–University of North Carolina at Chapel Hill Evidence-based Practice Center (RTI-UNC EPC) addressed 15 Key Questions (KQs) in this review. Of these KQs, nine address efficacy and effectiveness of treatment (benefits and harms overall and benefits for various patient subgroups)—three for BED, three for LOC eating among bariatric surgery patients, and three for LOC eating among children. The other six KQs deal with course of illness, overall and for various subgroups, for BED or LOC eating. For this review, we use the term *effectiveness* to include efficacy.

KQ 1: What is the evidence for the effectiveness of treatments or combinations of treatments for binge-eating disorder?

KQ 2: What is the evidence for harms associated with treatments for binge-eating disorder?

KQ 3: Does the effectiveness of treatments for binge-eating disorder differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

KQ 4: What is the course of illness of binge-eating disorder?

KQ 5: Does the course of illness of binge-eating disorder differ by age, sex, race, ethnicity, sexual orientation, body mass index, duration of illness, or coexisting conditions?

KQ 6: What is the evidence for the effectiveness of treatments or combinations of treatments for loss-of-control eating among bariatric surgery patients?

KQ 7: What is the evidence for harms associated with treatments for loss-of-control eating among bariatric surgery patients?

KQ 8: Does the effectiveness of treatments for loss-of-control eating among bariatric surgery patients differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

KQ 9: What is the course of illness of loss-of-control eating among bariatric surgery patients?

KQ 10: Does the course of illness of loss-of-control eating among bariatric surgery patients differ by age, sex, race, ethnicity, sexual orientation, initial body mass index, duration of illness, or coexisting conditions?

KQ 11: What is the evidence for the effectiveness of treatments or combinations of treatments for loss-of-control eating among children?

KQ 12: What is the evidence for harms associated with treatments for loss-of-control eating among children?

KQ 13: Does the effectiveness of treatments for loss-of-control eating among children differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

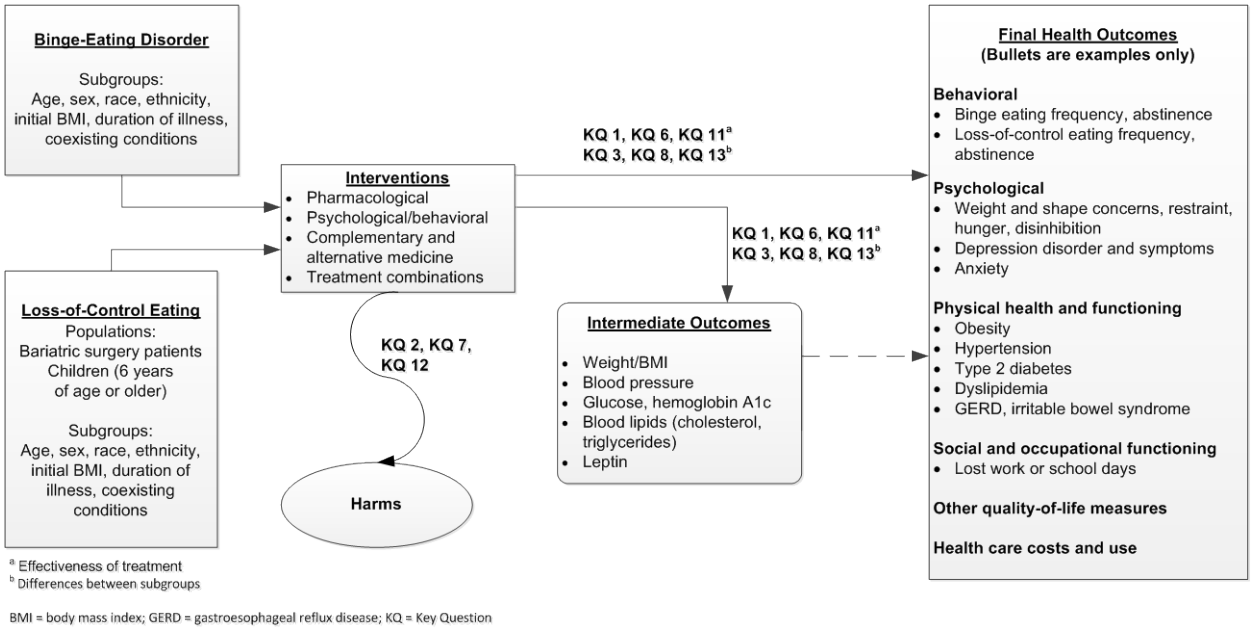
KQ 14: What is the course of illness of loss-of-control eating among children?

KQ 15: Does the course of illness of loss-of-control eating among children differ by age, sex, race, ethnicity, initial body mass index, duration of illness, or coexisting conditions?

Analytic Frameworks

The relationships among the patient populations, interventions, comparators, outcomes, and timing of outcomes assessment (PICOTs) is depicted for each of the treatment KQs in Figure 1 and for each of the course of illness KQs in Figure 2. The populations of interest are displayed in the far left boxes; these boxes project through the central box displaying the interventions of interest (Figure 1 only) to the box on the far right that displays the final health outcomes either directly or through the intermediate outcomes.

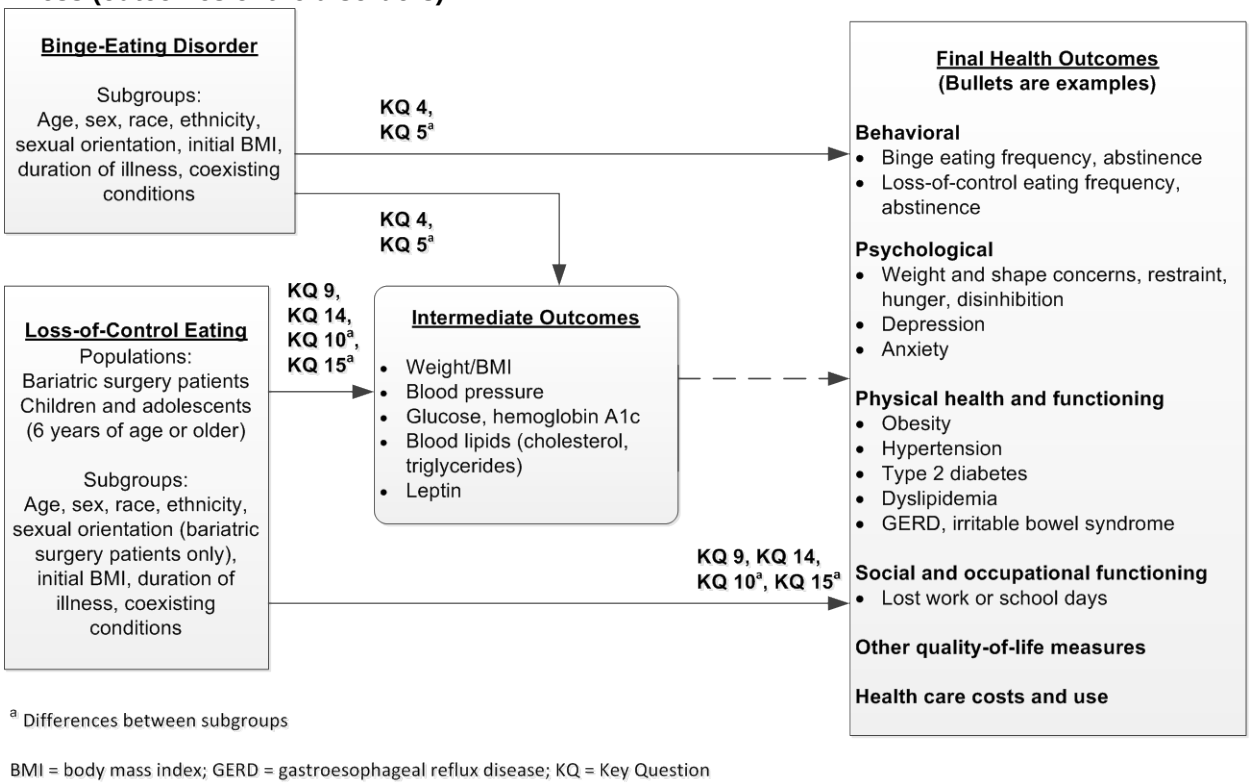
Figure 1. Analytic framework for Binge-Eating Disorder and Loss-Of-Control Eating: Effectiveness and harms of interventions



[a] Effectiveness of treatment
[b] Differences between subgroups

BMI = body mass index; GERD = gastroesophageal reflux disease; KQ = Key Question

Figure 2. Analytic framework for Binge-Eating Disorder and Loss-Of-Control Eating: Course of illness (outcomes of the disorders)



[a] Differences between subgroups

BMI = body mass index; GERD = gastroesophageal reflux disease; KQ = Key Question

Organization of This Report

In the following chapters we describe our methods (Chapter 2) and present our key findings in three chapters (Chapter 3—treatments for BED; Chapter 4—treatments for LOC eating; Chapter 5—course of illness). In Chapter 6, we give our synthesis of the evidence base and discuss our findings; we examine the limitations of the evidence base and this review, clarify gaps in the knowledge base, and offer recommendations for future research. References follow the final chapter.

The main report has several appendices, as follows: A, search strategies; B, criteria to exclude at the full text stage; C, excluded studies; D, risk-of-bias tables; E, detailed evidence tables; F, strength of evidence tables and G, a glossary of terms.

Methods

The Evidence-based Practice Center (EPC) conducted this review using the research methods described in the Agency for Healthcare Research and Quality (AHRQ) Methods Guide for Effectiveness and Comparative Effectiveness Reviews.[112] Further, we used the PRISMA Statement as a guide to ensure transparent reporting.[113]

Topic Refinement and Protocol Review

The EPC developed this topic and key questions through a public process. The topic was nominated by the Binge-Eating Disorder Association and subsequently developed and refined by a team at the RTI-UNC EPC with input from Key Informants in the field. AHRQ posted key questions for public comment (1/13/2014). We incorporated public comments and guidance from a Technical Expert Panel (TEP) into the final research protocol, which was also posted on the AHRQ Web site (4/23/2014).

Literature Search Strategy

Search Strategy

We conducted focused searches of MEDLINE® (via PubMed), EMBASE, CINAHL (nursing and allied health database), Academic OneFile and the Cochrane Library. An experienced research librarian used a predefined list of search terms and medical subject headings (MeSH). The librarian completed the search that was used to complete the draft report on 6/23/2014, and a second update search will be conducted during peer review. We limited included evidence to studies published in English, given limited resources. However, to enhance our discussion, we reviewed abstracts of articles not published in English that included English language abstracts. We will comment on what we may have missed by limiting our included evidence based on language. The complete search strategies, including specific limitations used for each database, are presented in Appendix A.

We searched unpublished and grey literature relevant to the review topic. Methods for identifying grey literature included a review of trial registries, specifically ClinicalTrials.gov, Health Services Research Projects in Progress (http://www.nlm.nih.gov/hsrproj/), and the European Union Clinical Trials Register (https://www.clinicaltrialsregister.eu/). Further, AHRQ requested Scientific Information Packets (SIPs) from the developers and distributors of the interventions identified in the literature review. SIPs allow an opportunity for the intervention developers and distributors to provide the EPC with both published and unpublished data that they believe should be considered for the review. We included unpublished studies that met all inclusion criteria and contained enough information on their research methods to permit us to make a standard risk-of-bias assessment of individual studies.

We searched reference lists of pertinent review articles for studies that we should consider for inclusion in this review. For older studies on binge-eating disorder (BED) treatment and course of illness, we searched the relevant portion of the reference list of our 2006 review, *Management of Eating Disorders*.[97,111,114] However, we did not rely on our earlier review to identify relevant studies; our electronic database search identified studies published from root to the search date.

Inclusion and Exclusion Criteria

Table 4 outlines the Populations, Interventions, Comparators, Outcomes, Timing, and Settings (PICOTS) that define the major inclusion criteria for studies in this review. In the following sections we provide additional detail related to each of these domains as needed.

Table 4. Inclusion and exclusion criteria for studies of binge-eating disorder and loss-of-control eating

Category	Criteria	
	Inclusion	**Exclusion**
Population	Individuals of all races, ethnicities, and cultural groups in one of three subpopulations: (1) meeting DSM-IV or DSM-5 criteria for BED; or (2) postbariatric surgery patients with LOC eating; or (3) children with LOC eating. Because LOC eating has no commonly accepted definition, studies included in the review may define LOC eating using different diagnostic criteria.	Co-occurring AN or BN BED only: • Children, but will not exclude studies with adolescents LOC eating only: • Co-occurring BED • Children younger than 6 years of age Studies of RCTs with fewer than 10 participants and nonrandomized studies with fewer than 50 participants.
Geography	No limit	None
Date of search	Searches will go back until 1980; searches will be updated after the draft report goes out for peer review	None
Study duration	No limit	None
Settings	No limit; for treatment, studies include inpatient, outpatient, or home-based treatment settings for treatments such as self-help; course-of-illness studies include these setting and also community-based observation	None
Interventions	Pharmacological, behavioral, psychological, or CAM treatments or combinations as described in the PICOTS criteria	Pharmacological interventions not marketed in the US
Control interventions	Any active intervention described in the PICOTS criteria, placebo, or usual care	Pharmacological interventions not marketed in the US
Outcomes	As described in the PICOTS criteria, intermediate and final health outcomes, treatment harms, and costs (e.g., health care cost and use, lost work days). Intermediate health outcomes will include biomarkers that can be linked directly to final physical health outcomes, such that an accumulation or worsening over time in that biomarker would result in the final health outcome	Studies that do not include at least one of the outcomes listed in the PICOTS criteria.
Timing of outcome measurement	Treatment studies: end of treatment or later Course-of-illness studies: 1 year or later after study entry or diagnosis	Treatment studies: Outcome measurement prior to study completion only Course-of-illness studies: Outcome measurement less than 1 year post-study entry

Table 4. Inclusion and exclusion criteria for studies of binge-eating disorder and loss-of-control eating (continued)

Category	Criteria	
	Inclusion	**Exclusion**
Study design	Original research Eligible study designs include • RCTs • Nonrandomized controlled trials • Prospective cohort studies • Retrospective cohort studies • Case-control studies Systematic review and meta-analyses	• Case series • Case reports • Nonsystematic reviews • Studies of treatment benefits without a control or comparison group

AN= anorexia nervosa; BED = binge-eating disorder; BN= bulimia nervosa; CAM = complementary and alternative medicine; DSM = Diagnostic Statistical Manual; LOC = loss of control; PICOTS = populations, interventions, comparators, outcomes, timing, and setting; RCT = randomized controlled trial; US = United States

Population

The populations of interest for this review included individuals meeting either DSM-IV or DSM-5 criteria for BED, post-bariatric surgery patients meeting criteria for loss-of-control (LOC) eating after surgery, and children (6 years of age and older) meeting criteria for LOC eating. We excluded studies that focused on the interventions of interest, but did not isolate results for individuals with only BED or LOC eating, because we could not measure the results in the BED or LOC eating population.

Interventions

Interventions included pharmaceutical, psychological, or behavioral treatments, as well as complementary and alternative medicine (CAM). Pharmaceutical interventions include but were not limited to antidepressants, anticonvulsants, attention deficit hyperactivity disorder (ADHD) medications, and weight loss medications. Psychological and behavioral interventions included, but were not limited to cognitive behavioral therapy (CBT), interpersonal psychotherapy (IPT), and dialectical behavior therapy (DBT). Interventions could include a combination of these interventions, such as combinations of psychological and behavioral interventions or psychological and pharmacological interventions. Pharmacotherapy and CAM interventions may differ in dosages and duration of treatment. Psychological or behavioral interventions may differ in format (e.g., individual or group, therapist-led or self-help), frequency, and duration of treatment.

Comparators

All treatment studies included in this review had to have at least two groups. Acceptable comparisons included one of the other treatment comparisons included in the review, placebo, nonintervention, or waitlist controls or treatment as usual.

Studies that included adjunct therapies that were not the focus of the review, such as pharmaceutical interventions in behavioral treatment studies, were included if those therapeutic modalities were provided similarly to all study groups.

Outcomes

Corresponding to our KQs (key questions), study outcomes were categorized as evaluating treatment effectiveness (KQ 1, KQ 6, KQ 11), treatment harms (KQ 2, KQ 7, KQ 12), and course of illness (KQ 4, KQ 9, KQ 13). Treatment effectiveness and course of illness outcomes were grouped as binge-eating outcomes, eating-related psychopathology outcomes, weight-related outcomes, general psychological outcomes (such as depression), and other (such as quality of life). Potential harms varied across interventions (i.e., pharmaceutical, psychological, behavioral). Outcome differences between subgroups were evaluated in relation to treatment effectiveness and course of illness.

Timing

We included treatment studies that reported outcomes at the end of treatment or later. Course of illness studies were included if they had a 1-year minimum followup from the diagnosis of BED or LOC eating.

Setting

We included studies with an inpatient setting including hospitals and residential treatment centers as well as outpatient settings, including schools and homes.

Study Designs

Table 5 describes the study design inclusion criteria developed for this report.

Table 5. Study inclusion criteria for review of binge-eating disorder and loss-of-control eating

Category	Criteria for Inclusion
Study design	Meta-analyses, systematic reviews, RCTs, and nonrandomized controlled trials, prospective and retrospective cohort studies, and case-control studies. Systematic reviews were considered to be included studies only if they provided information that was used in the evidence synthesis. As such, systematic reviews that were used exclusively for identifying primary studies were excluded.
Study duration	Unlimited
Sample size	RCT studies: Unlimited Non-RCTs, cohort and other studies used primarily to review course of illness: 50 or more participants in each group.
Study location	Unlimited
Language of publication	Given the volume of literature on this topic, we limited our search to publications in the English language.

KQs = key questions; RCT = randomized controlled trial.

Study Selection

Seven trained members of the research team reviewed article abstracts. Two of the members of the research team independently reviewed all titles and abstracts produced by the searches to determine study eligibility against predefined inclusion and exclusion criteria. Studies marked for possible inclusion by either reviewer underwent a full-text review. Each full-text article was again independently reviewed by two members of the team to determine if it met inclusion criteria. If both reviewers agreed that a study did not meet the eligibility criteria, it was excluded; each reviewer recorded the primary reason for exclusion. If the reviewers disagreed, they resolved conflicts by discussion and consensus or by consulting a third member of the review

team. A form listing the criteria used to exclude studies based on full-text review form is reproduced in Appendix B.

The project coordinator tracked results of the abstract and full-text reviews in an EndNote database (EndNote® X4). Appendix C contains a complete list of studies excluded during the full-text review, denoted by their primary reason for exclusion.

We screened unpublished studies identified through grey literature search (primarily clinical trials databases) and review of SIPs using the same title/abstract and full-text review processes.

Data Abstraction

We developed a template for evidence tables for data synthesis using the PICOTS framework. For the systematic reviews and additional studies that met inclusion criteria, we abstracted relevant information into these evidence tables using Microsoft Excel. We abstracted characteristics of study populations, interventions, comparators, settings, study designs, methods, and results. Data from studies included in systematic reviews were abstracted as they were presented in the review, although we did refer to the original article to obtain additional information for clarification purposes; for example, we referred to the original article to determine if additional data concerning subgroup analyses and outcomes of interest, including harms, were contained in any of the studies and not reported in the overall systematic review results. Six trained members of the team participated in the data abstraction. One of the reviewers initially abstracted the relevant data from each included article and a second more senior member of the team reviewed each data abstraction against the original article for completeness and accuracy.

Risk-of-Bias Assessment

For each included systematic review and study, we assessed the potential for selection bias, performance bias, attrition bias, detection bias, and outcome reporting bias (Appendix D). The risk-of-bias assessment was conducted using three tools. The first is appropriate for trials and consists of questions and response categories from the Cochrane risk- of-bias tool[115] for RCTs and summary judgments corresponding with EPC guidance.[116] The second is appropriate for evaluating risk of bias in non-RCTs and observational studies, used in this review to assess studies of course of illness. This form was modified from 2 existing tools, one developed by one of the study authors[117] and a pilot version of one recently developed by the Cochrane Collaboration.[118] (Both tools are available to the public on-line at the websites identified in the references.)The third is AMSTAR,[119] appropriate for the assessment of multiple systematic reviews. Two independent reviewers rated the risk of bias for each study. Disagreements between the two reviewers were resolved by discussion and consensus or by consulting a third member of the team.

Results of this assessment are summarized by a rating of low, medium, or high risk of bias. In general, an RCT with a low risk of bias has a strong design (adequate randomization and allocation concealment and controls for concurrent treatments), measures outcomes appropriately including blinding of the patient and provider (if possible) and outcome assessor, reports low attrition or adequately addresses potential bias from attrition through analytic methods, and reports methods and outcomes clearly and precisely. RCTs with a medium risk of bias are those that do not meet all criteria required for low risk of bias but do not have flaws that are likely to cause major bias. RCTs with a high risk of bias include those with at least one major issue that has the potential to cause significant bias and thus might invalidate the results. Examples of

flaws leading to a high risk-of-bias rating include different application of inclusion/exclusion criteria between arms, substantial differences in arms at baseline, high overall attrition, or differential attrition across arms that is not adequately addressed through analytic methods, or lack of control for concurrent treatment.

The risk of bias of cohort and case control studies, which we used as evidence for reviewing course of illness, were evaluated in comparison to the characteristics of a high quality study of the same design. Key concerns in these studies include many of the same considerations as RCTs. However, because these studies do not include randomization, a key consideration in the risk-of-bias assessment is control for critical potential confounding, either through design or statistical analyses.

A high risk-of-bias rating was assigned to studies in which the critical information needed to make that assessment was not reported or unclear or the conduct or analysis was severely flawed. To maintain a focus on interpretable evidence, we opted to generally not include studies with a high risk of bias in the synthesis of treatment benefits findings in the results chapters of this review. However, we did consider high risk-of-bias studies as evidence of treatment benefit in sensitivity analyses using meta-analysis, as evidence for treatment harms and course of illness. We briefly describe why studies were rated as high risk of bias in text. We list each study rated as high risk of bias reconciled reviewer responses to each question in the risk-of-bias instrument, and the main reasons we gave it that rating in Appendix D.

Data Synthesis

Across all included studies, we only had sufficiently similar evidence from studies of pharmacological interventions for synthesis through pooled meta-analysis. We did all other analyses qualitatively, based on our reasoned judgment of similarities in measurement of interventions and outcomes, and homogeneity of patient populations.

We conducted all meta-analyses using Comprehensive Meta-Analysis, version 3.2 to estimate the overall effect sizes for treatment compared with placebo for each outcome. Random effects models were applied to estimate overall effects across studies. Effect sizes were odds ratios for the dichotomous outcome (abstinence) and standardized mean differences for the continuous outcomes (binge episodes per week, binge days per week, BMI, weight, and depression scores). In all meta-analyses we compared second-generation antidepressants (SGAs) as a class or anticonvulsants as a class with placebo. We assessed statistical heterogeneity in effects between studies by calculating the chi-squared statistic and Cochran's q. We used the I^2 statistic (the proportion of variation in study estimates attributable to heterogeneity) to estimate the magnitude of heterogeneity. We conducted sensitivity analyses, measuring the effect of high risk-of-bias studies on pooled results.

We recalculated remission (abstinence) rates for each study using the number of all randomized patients as the denominator to reflect a true ITT analysis. With this approach, we attempted to correct variations in results of modified ITT analyses encountered in individual studies.

Strength of the Body of Evidence

In the key points section we present the strength of evidence for each comparison and overarching outcome (e.g., binge eating, weight) as specified for each KQ. We graded the strength of evidence based on the EPC Methods Guide for conducting comparative effectiveness reviews (CERs), as detailed in the paper by Berkman and colleagues.[120] The EPC approach

incorporates five key domains: study limitations, directness, consistency, and precision of the evidence and reporting bias.

- Study limitations are determined according to the "degree to which the included studies for a given outcome have a high likelihood of adequate protection against bias." It is scored as low, medium, and high.
- Directness is determined based on "whether the evidence links the interventions directly to a health outcome of specific importance to the review." Directness also accounts for the directness of the evidence; whether the data were obtained from head-to-head comparisons. Both aspects of directness are considered in scoring evidence as direct or indirect. In this review, virtually all of the included measures are direct. When a body of evidence includes both indirect and direct measures, the presence of one or more direct measures will result in a "direct" grade.
- Consistency is the "degree to which included studies find the same direction or magnitude of effect." Each body of evidence is scored as consistent, inconsistent, or unknown. Consistency cannot be assessed when a body of evidence has only a single study and in those instances is scored as unknown.
- Precision is determined according to "the degree of certainty surrounding an effect estimate" for each outcome separately, taking into consideration sample size and number of events. "Precise" indicates a clinically useful conclusion, and "imprecise" indicates that no conclusion can be drawn as to whether either treatment is superior or whether the treatments are equivalent.
- Lastly, reporting bias is selectively publishing or reporting research findings based on the favorability of direction or magnitude of effect and is determined based on an evaluation of publication bias (nonreporting of full studies), selective outcome reporting bias (incomplete reporting of outcomes), and selective analysis reporting (selectively reporting more favorable analyses. It is scored as suspected or undetected.

The overall grades for strength of evidence, based on the scores for the above domains, are described in Table 6. Grades reflect the strength of the body of evidence to answer the KQs on the comparative effectiveness, efficacy, and harms of the interventions in this review for each key outcome. Strength of evidence grades were also developed for key outcomes for course-of-illness

Table 6. Definitions of the grades of overall strength of evidence

Grade	Definition
High	We are very confident that the estimate of effect lies close to the true effect for this outcome. The body of evidence has few or no deficiencies. We believe that the findings are stable, i.e., another study would not change the conclusions.
Moderate	We are moderately confident that the estimate of effect lies close to the true effect for this outcome. The body of evidence has some deficiencies. We believe that the findings are likely to be stable, but some doubt remains.
Low	We have limited confidence that the estimate of effect lies close to the true effect for this outcome. The body of evidence has major or numerous deficiencies (or both). We believe that additional evidence is needed before concluding either that the findings are stable or that the estimate of effect is close to the true effect.
Insufficient	We have no evidence, we are unable to estimate an effect, or we have no confidence in the estimate of effect for this outcome. No evidence is available or the body of evidence has unacceptable deficiencies, precluding reaching a conclusion.

Source: Berkman et al., in press,[120] Berkman et al. (2013)[120,121]

Two reviewers assessed each domain independently and also assigned an overall grade for comparisons for each key outcome listed in the framework; they resolved any conflicts through consensus discussion. If they did not reach consensus, the team brought in a third party to settle the conflict. Typically, evidence from just one study was considered insufficient to permit confidence in the estimation of an effect. Exceptions were single study bodies of evidence consisting of a relatively larger, low risk of bias trial, particularly if it showed a large magnitude of effect or large dose response.

Applicability

We assessed the applicability both of individual studies and of the body of evidence. For individual studies, we examined factors that may limit applicability based on the PICOTS structure. Examples of characteristics examined include:

- Population
  - Narrow eligibility criteria, or exclusion of patients with comorbidities;
  - Large differences between demographics of the study population and community patients.
- Intervention
  - Intensity and delivery of interventions that may not be feasible for routine use;
  - Highly selected intervention team or level of training/proficiency not widely available.
- Comparators
  - Comparison group does not represent an available alternative treatment.

Such factors may be associated with heterogeneity of treatment effect and may lessen our ability to generalize the effectiveness of an intervention to use in everyday practice. We abstracted key characteristics of applicability into evidence tables.

During data synthesis, we assessed the applicability of the body of evidence using the abstracted characteristics. KQs 3, 8, and 13 include an analysis of intervention effectiveness in population subgroups for each disorder.

Peer Review and Public Commentary

Experts in BED and LOC eating, specifically clinicians and researchers specializing in pharmacotherapy treatment, psychotherapy and behavioral treatment, pediatrics, and evidence-based interventions, were invited to provide external peer review of the draft CER. AHRQ and an Associate Editor also provided comments. The EPC Associate Editors are leaders in their respective fields and are actively involved as directors or leaders at their EPCs. Their role is to assess adherence to established methodology and guidelines for EPC-based research. The draft report will be posted on the AHRQ Web site for 4 weeks to elicit public comment. We will respond to all reviewer comments and note any resulting revisions to the text in the "Disposition of Comments Report." This disposition report will be made available 3 months after the final CER is posted on the AHRQ Web site.

Results: Overview and Binge-Eating Disorder

Overview of Presentation of Results

This is the first of three chapters of results. This chapter first presents the results of our literature searches. We then discuss the findings of our analyses for each key question (KQ) in this and two subsequent chapters. The review includes 15 KQs (the same five KQs repeated three times, corresponding to the three conditions that are the focus of the review. The order of the quintet of questions is (1) treatment effectiveness; (2) treatment harms; (3) differences in treatment effectiveness between subgroups; (4) course-of illness; and (5) differences in course of illness between subgroups.

This chapter discusses the results for KQs concerning treatment for BED (KQs 1 - 3). Chapter 4 discusses the results concerning treatment for loss-of-control (LOC) eating in bariatric surgery patients (KQs 6 - 8) and treatment for LOC eating in children (KQs 11- 13). Chapter 5 discusses the evidence concerning the course of illness for each of the three conditions; BED (KQs 4 and5), LOC eating in bariatric surgery patients (KQs 9 and10) and LOC eating in children (KQs 14 and 15).

We describe each included study at the beginning of the first treatment effectiveness or course of illness results section in which it is discussed. Because virtually all studies are included for treatment effectiveness or course of illness, we do not repeat the description of studies in answering KQs concerning harms or differences between subgroups. Exceptions are the high risk of bias studies included for harms. We then present key points along with grades for strength of evidence for major comparisons and outcomes; that material is followed by text and tables providing a more detailed synthesis of the included studies. When no studies reported on categories of outcomes, we note that fact in key points and do not repeat it in detailed synthesis.

We present all the relevant results from meta-analyses that we conducted in synthesizing our evidence. We were able to conduct meta-analysis for some comparisons of BED pharmacotherapy with placebo. We were not able to conduct quantitative syntheses for any BED behavioral intervention comparisons or for any treatment comparisons among bariatric surgery patients or children with LOC eating; the main reasons were that our evidence base had too few studies or studies that were too heterogeneous in interventions and outcomes. For those bodies of evidence, we conducted qualitative synthesis.

For each type of comparison, we present the study characteristics, summary evidence, and strength of evidence in tabular form with accompanying text that addresses treatment efficacy across four general outcomes: binge-eating outcomes, eating-related psychopathology outcomes, weight and weight-related outcomes, general psychological outcomes and other outcomes. Detailed strength of evidence tables appear in Appendix F. We record the final strength of evidence grades for the most critical findings in these chapters.

We encountered considerable variability across these studies in two main components. One is the measures that investigators used to assess outcomes (for example, binge episodes, binge days, binge abstinence); the other is the methods they used to determine whether differences were statistically significant (e.g., regression methods that yielded estimates of the rate of change in outcomes; analysis of variance [ANOVA] methods that yielded estimates of the change in outcomes from baseline to endpoint). Our summary of evidence on treatment effectiveness focuses on differences in outcomes between the treatment and comparator arms at the end of treatment and, in some cases, after later followup. For this report, we define followup as either

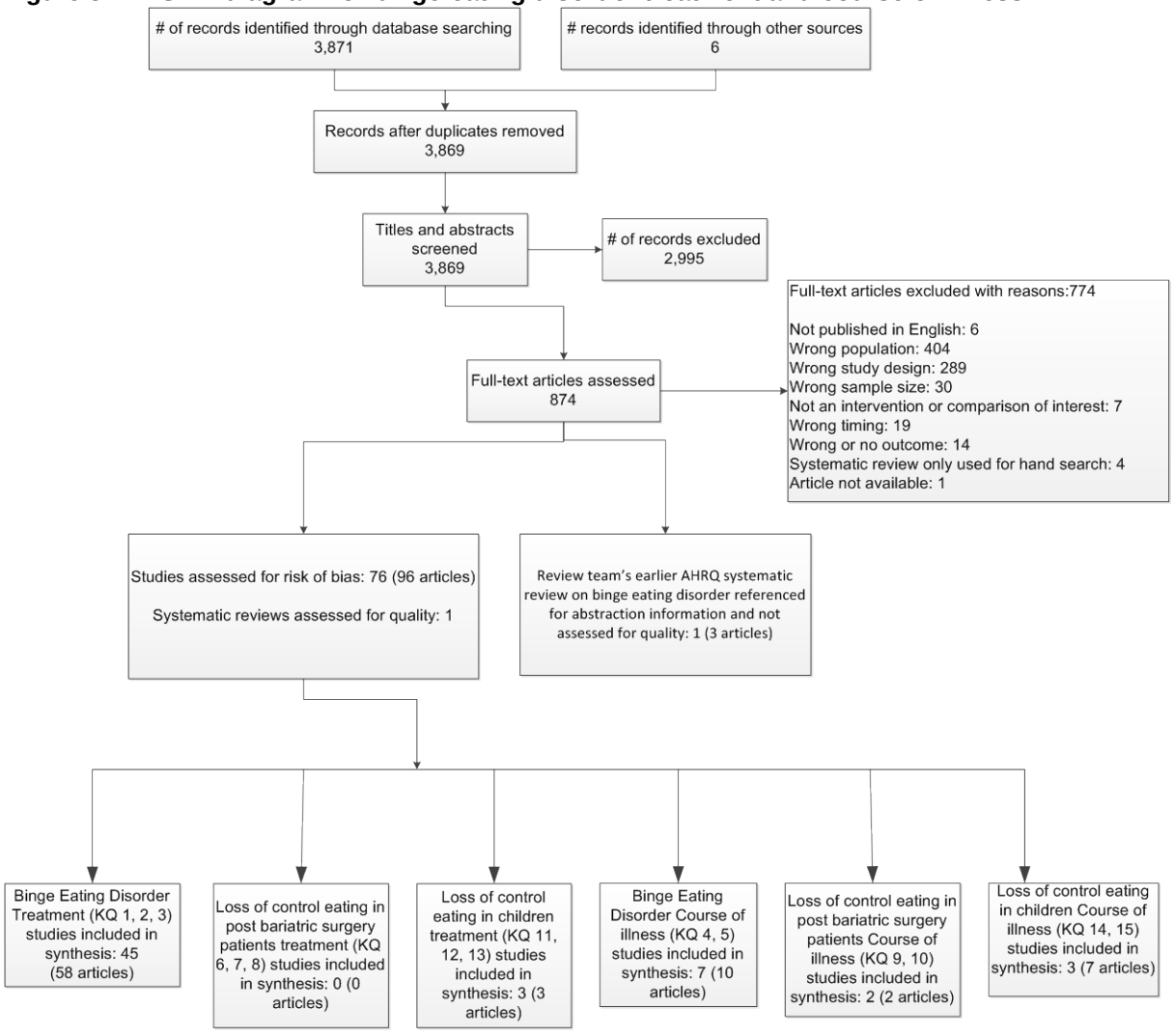
short-term (< 12 months after the end of treatment) or long-term (≥ 12 months after the end of treatment). We limited evidence of course of illness to studies measuring long-term followup.

We included in evidence of treatment effectiveness only studies that we had rated as low or medium risk of bias, with two exceptions. We included studies with high risk of bias for sensitivity analysis testing of meta-analysis results, and we used such studies for evidence of treatment harms. For evidence of BED course of illness, we included observational studies that we rated as high risk of bias because of the small number of studies available to answer these KQs.

Literature Search

Figure 3 (the PRISMA diagram) depicts our literature search results. Initial literature searches completed on June 9, 2014, along with records identified through hand searches yielded 3,869 unduplicated citations. Appendix A provides a list of all search terms used and the results of each literature search.

Figure 3. PRISMA diagram for binge-eating disorder treatment and course of illness



KQ = key question

After applying our eligibility and exclusion criteria to titles and abstracts of all identified citations, 874 citations for full-text review remained. We reapplied our inclusion criteria and excluded 774 of these articles from further review before doing our risk-of-bias assessment. Appendix C provides a list of excluded studies and reasons for exclusion at the full-text stage.

Seventy-six studies (reported in 96 articles) and one systematic review met our inclusion critera. We also used several of the abstractions from our 2006 systematic review (reported in three articles) on eating disorders to develop the BED treatment and course of illness results sections in this report;[97,111,114] we did not, however, do a quality assessment for our systematic review. We also did not use 17 studies in our main analyses of treatment benefits because of their high risk of bias. In keeping with standard approaches; however, we did include two of these studies in sensitivity analysis of our meta-analysis findings.[85,122] we also used seven of these studies in our assessment of treatment harms.[81,85,87,122-125] We identified 15 studies (19 articles) meeting inclusion criteria for course of illness KQs. We used all 15 studies in that evidence synthesis, regardless of our risk of bias rating for the study.

Evidence tables for all included studies are provided in Appendix E; the risk-of-bias assessments can be found in Appendix D.

Of the 20 fair- or good-quality studies on treatment for BED included in our previous systematic review cited above, 19 studies met the inclusion criteria for this review. One study had used sibutramine as a treatment method;[126] for this review, we excluded treatment studies with this medication because it is no longer available in the United States.

Four studies[79,81,85,127] that we had originally rated as good or fair quality for the earlier review were newly rated as high risk of bias; we omitted them, therefore, from our main analyses. The earlier review also included three studies on BED course of illness that we have used in this review.[128-130] Risk of bias assessments for all included studies can be found in Appendix D.

Binge-Eating Disorder: Overview

In relation to treatment effectiveness for BED (KQ 1), we address three broad categories of treatment, presented in this order: pharmacological, psychological or behavioral, and combination treatments. In light of uncertainty in the field regarding the definition of BED remission and recovery, we use the term "abstinence" to mean zero binges in the most recent assessment period (usually the past month). Thus, in our report, we substitute the term "abstinence" for "remission" when authors used the term "remission" to mean zero binges in the most recent assessment period; in addition, we substitute the term "abstinence" when authors simply reported the outcome as "cessation of binge eating." In doing so, we preserved the term "remission" to reflect a more sustained, global state of change marked by the absence not only of binges but of other BED criteria for an extended period of time.

In the category of pharmacological treatments, the 23 included trials involved antidepressants, anticonvulsants, an anti-obesity drug, and a variety of other agents including one dietary supplement. Among the antidepressants were several selective serotonin reuptake inhibitors (SSRIs), a tricyclic antidepressant, and several agents that primarily inhibit norepinephrine reuptake *(i.e.,* norepinephrine-dopamine reuptake inhibitor [NDRI] or selective serotonin-norepinephrine reuptake inhibitor [SNRI]).

In the category of psychological or behavioral treatments, the 23 included trials involved cognitive behavioral therapy (CBT), dialectical behavioral therapy (DBT), interpersonal psychotherapy (IPT), behavioral weight loss (BWL), and inpatient treatment (i.e., multi-level integrated treatment delivered in the inpatient setting by a team of care providers). The CBT

trials included variations based on the degree of therapist involvement; interventions could be led fully or partially by the therapist or involve various self-help strategies (structured, guided, or pure). Seven trials provided data on combination treatments, including pairings of CBT, BWL, hypocaloric diet, and diet counseling with either an antidepressant or an anti-obesity medication; two of the seven trials paired compound behavioral treatments (i.e., CBT plus BWL, CBT plus diet counseling) with an antidepressant. All trials that included a combination behavioral plus pharmacological treatment arm also included a comparable combination placebo-controlled treatment arm (e.g., CBT plus antidepressant compared with CBT plus placebo).

Across these trials, the use of various approaches to measurement resulted in considerable variability in the reporting of outcomes; these reflected measures of differences at endpoint (i.e., end of treatment and/or longer term followup), change from baseline to endpoint, rate of change over the course of treatment, and in some cases all three. Given the variability in outcome reporting and treatment comparisons, we were able to conduct meta-analyses only to measure the efficacy of antidepressant treatments on several outcomes and the efficacy of anticonvulsant treatments for abstinence. We conducted sensitivity analyses to evaluate the impact of the addition of one high risk-of-bias antidepressant study[85] and one high risk-of-bias anticonvulsant study[122 224] on our results.

KQ 1: Effectiveness of Interventions for Binge-Eating Disorder

Pharmacological Interventions: Antidepressants Compared with Placebo

Description of Studies

The included evidence about the efficacy of antidepressants for treatment of BED consisted of the eight randomized controlled trials (RCTs, all placebo-controlled) described in Table 7. We rated four trials low risk of bias and four medium risk of bias. Of these eight RCTs, six involved an SSRI,[82-84,86,92,131] and one each involved an NDRI[132] or an SNRI.[90] Sample sizes ranged from 34 to 85. All eight trials focused on adults 18 years or older, up to 65 years of age (mean age range: 39 to 44 years); all included overweight or obese participants (mean BMI range: 35.5 to 40.6). Overall, a total of 470 individuals were randomized to treatment; of these, 54 were randomized to a combination antidepressant plus behavioral treatment. (see below "Pharmacological Interventions: Combination Treatments Compared with Placebo and with Other Treatments"). Of the 416 randomized to just an antidepressant or placebo, most were female (range: 78 percent to 100 percent) and few self-identified as being from a minority background (nonwhite, range: 0 percent to 27 percent).

In the six SSRI trials, two studied fluoxetine,[82,131] and one each studied citalopram,[84] escitalopram,[92] fluvoxamine,[86] and sertraline.[83] The six SSRI trials differed in duration of treatment (6 to 16 weeks); none followed participants after treatment ended.

The two fluoxetine trials differed in dose and duration. One regimen was 60 mg/day (the dose indicated by the US Food and Drug Administration [FDA] for treating bulimia nervosa) for 16 weeks.[131] The other regimen was 80 mg/day (the maximum dose recommended in the treatment of severe obsessive compulsive disorder) for 6 weeks.[82]

The two remaining trials included the NDRI bupropion, 300 mg/day for 8 weeks,[132] and the SNRI duloxetine, 120 mg/day for 12 weeks.[90]

All eight trials reported binge eating, weight, and general psychological outcomes, and all but three[82,83,86] reported outcomes specific to eating-related psychopathology.

Table 7. Characteristics of included intervention studies of antidepressants for Binge-Eating Disorder

Author, Year **Country** **Funding Source** **Setting** **Design** **Risk of Bias**	**Diagnosis (Diagnostic Method)** **N Randomized** **Treatment (Length of Post-Treatment Followup) Duration** **Key Inclusion Criteria** **Key Characteristics**	**Intervention** **Comparator** **Cointerventions**	**Major Benefit Outcome Measures** **Subgroup Analyses and Comparisons (if any)**
Arnold et al., 2002[82] USA Outpatient RCT Medium	DSM IV (SCID) G1: 30 G2: 30 6 wk. 18-60 yr.; weight >85% IBW Mean age: 41.4 yr. Female 93% Nonwhite: 12% Mean weight:107 kg (completers) Mean BMI:38.2 Lifetime MDD:65% Current MDD: 25%	G1: Fluoxetine: 20mg/day titrated up to 60 mg/day over 6 days, then up to 80 md/day after 2 wks. G2: Placebo: same dosing as active tx Co-intervention: none	Binge • Binges/wk • Abstinence Psychological • CGI-Severity • HDRS Weight • Weight • BMI
Grilo et al., 2005[131] USA Primary Care RCT Low	DSM IV (SCID, EDE) G1: 27 G2: 27 G3: 26 G4: 28 16 wk 18-60 yr., 100% - 200% of ideal body weight Mean age: 44 Female: 78% Nonwhite:11% Mean BMI: 36.3 Lifetime MDD: 50% Lifetime anxiety disorders: 37%	G1: Fluoxetine: 60 mg/day G2: Placebo: Same dosing as G1 G3: CBT+Fluoxetine: CBT: 16 weeks of individual, 60-min sessions using method of Fairburn et al.[133] Fluoxetine, same as GI G4: CBT+Placebo: CBT same as G3 Placebo: same dosing as G3 Co-intervention: minimal clinical management (< 15 mn. weekly during first 4 wk., biweekly thereafter)	Binge • Binge episodes/mo (EDE-Q) • Binge episodes/mo (daily self-monitoring) Eating-related • EDE-Q global, 4 scores • TFEQ 3 scores • BSQ Psychological • BDI Weight • BMI

Table 7. Characteristics of included intervention studies of antidepressants for Binge-Eating Disorder (continued)

Author, Year Country Funding Source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Guerdjikova et al., 2008[92] USA Outpatient RCT Low	DSM IV (SCID) G1: 21 G2: 23 12 wk. 18-60 yr., BMI ≥ 30 Mean age: 39 Female: 96% Nonwhite: 27% Mean weight: 111 kg Mean BMI: 40.2 Lifetime MDD: 77%	G1: Escitalopram: 10mg/day titrated up to 30mg/day over two weeks, as tolerated. G2: Placebo: Same dosing as active tx Co-intervention: none	Binge • Binge episodes/week • Binge days/week • Abstinence Eating-related • YBOCS-BE total, 2 subscales Psychological • CGI severity, improvement • HDRS Weight • Weight • BMI
Guerdjikova et al., 2012[90] USA Outpatient RCT Low	DSM IV-TR (SCID) G1: 20 G2: 20 12 wk. 18-65 yr., DSM-IV-TR criteria for a major depressive disorder ≥ one month immediately prior to randomization, binged ≥ 2 days/week for at least one week immediately prior to randomization, ≥ 25 on the IDS-C scale at screening and baseline Mean age: 40.1 Female: 88% Nonwhite: 17% Mean Weight: 114.7 kg Mean BMI: 40.6 Recurrent MDD: 25% Lifetime anxiety disorder: 12% Lifetime SUD: 5%	G1: Duloxetine: flexible dose starting 30mg/day and increased to max 120 mg/day by week 6. Dosing once or twice per day. G2: Placebo Co-intervention: none	Binge • Binge days/wk • Binge episodes/week • Abstinence Eating-rated • CGI-S-BE • CGI-I-BE • YBOCS-BE • TFEQ, 3 subscales Psychological • CGI-S-DD • CGI-I-DD • IDS-C • HAM-A Weight • Weight • BMI

Table 7. Characteristics of included intervention studies of antidepressants for Binge-Eating Disorder (continued)

Author, Year Country Funding Source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Hudson et al., 1998[86] USA Outpatient RCT Medium	DSM-IV (proposed in 1991) G1: 42 G2: 43 9 wk. 18-60 yr., weight > 85% of the midpoint of the ideal for height, ≥ 3 binge episodes per wk for ≥ 6 mo. Mean age = 42.1 Female = 91% Nonwhite = 4% Mean BMI = 35.5	G1: Fluvoxamine: 50mg/day for ≥ 3 days, titrated up to 300 mg/day through wk 9. G2: Placebo: Same dosing as in active tx Co-intervention: none Note: treatment began 1 wk after placebo run-in	Binge • Frequency of binges/week • Abstinence Psychological • CGI – Severity • CGI – Improvement • HDRS Weight • BMI
McElroy et al., 200[83] USA Outpatient RCT Medium	DSM IV G1: 18 G2: 16 6 wk. DSM criteria + estimated binge size ≥ 1500 kcal, 18-60 yr., weight > 85% of the midpoint of the ideal for height, ≥ 3 binge episodes per week for ≥ 6 mo Mean age: 42.1 Female: 94% Nonwhite: NR Mean BMI: 36.1 Lifetime MDD: 53%	G1: Sertraline: 50 mg/day for ≥ 3 days, dose adjusted to between 50 and 200 mg/day G2: Placebo, same dosing as active tx Co-intervention: none Note: treatment began 1 wk after placebo run-in	Binge • Binges/week • Abstinence Psychological • CGI – Severity • CGI – Improvement • HDRS Weight • BMI
McElroy et al., 2003[84] USA Outpatient RCT Low	DSM IV (SCID) G1: 19 G2: 19 6 wk. 18-60 yr., ≥3 binge-eating episodes weekly for past 6 mo,> 85% IBW Mean age: 40.6 Female: 95% Nonwhite: 13% Mean weight: 105.7 kg. Mean BMI: 37.8 Lifetime depression: 68% Current depression: 32%	G1: Citalopram: 20 mg/day titrated up to 60 mg/day over 2 wks and maintained as tolerated. G2: Placebo: same dosing as active tx Co-interventions: none	Binge • Binges/wk • Binge days/wk • Abstinence Eating-related • YBOCS-BE total, 2 subscales Psychological • HDRS Weight • BMI • Weight

Table 7. Characteristics of included intervention studies of antidepressants for Binge-Eating Disorder (continued)

Author, Year Country Funding Source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
White and Grilo, 2013[132] USA Outpatient RCT Low	DSM IV (SCID, EDE) G1: 31 G2: 30 8wk. Female, BMI 25-30, 18-65 yr. Mean age: 44.1 Nonwhite: 16% Mean BMI: 35.8 Lifetime Axis 1 comorbidity: 74% Lifetime mood disorder: 52% Lifetime anxiety disorder: 38% Lifetime SUD: 25%	G1: Buproprion: 150mg tablets, once daily for the first 3 days, then twice daily for study days 4-56 G2: Placebo: Same schedule as active tx Co-intervention: none	Binge • OBE (EDE monthly) • OBE (SR, per week) • SBE (EDE monthly) • SBE (SR per week) • Abstinence Eating-related • EDE global, 4 scores • FCI Psychological • BDI Weight • BMI • Weight

BDI = Beck Depression Inventory; BE = binge-eating; BMI = body mass index; CGI-I = Clinical Global Impressions-Improvement scale; CGI-S = Clinical Global Impressions-Severity of Illness scale; DSM = Diagnostic and Statistical Manual for Mental Disorders; EDE = Eating Disorder Examination; EDE-Q = Eating Disorder Examination Questionnaire; FCI = Food Craving Inventory; G = group; HAM-A = Hamilton Anxiety scale; HDRS = Hamilton Depression Rating Scale; IBW = ideal body weight; IDS-C = Inventory of Depressive Symptomatology; IV = fourth edition; kcal = kilocalories; kg = kilogram; MDD = Major Depressive Disorder; RCT = randomized controlled trial; mg = milligrams; mo = months; N=number; NR = not reported; OBE = objective binge episode; SDRS = Self Depression Rating Scale; SBE = subjective binge episode; SUD = substance use disorder; TFEQ = Three-Factor Eating Questionnaire; TR = Text Revision; tx = treatment; US = United States; wk = week; YBOCS = Yale-Brown Obsessive Compulsive Scale

Key Points – Meta-Analysis Results

- As a class, antidepressants were associated with better binge-eating outcomes, at end of treatment, based on several measures:
  - Higher odds of abstinence than placebo, based on meta-analysis of eight RCTs (N= 416) (odds ratio [OR], 2.15; 95% confidence interval [CI] 1.40 to 3.31, p=0.001) (high strength of evidence [SOE] for benefit).
  - Greater reduction in binge episodes per week than placebo, based on seven RCTs (N= 331) (standardized mean difference [SMD], −0.37; 95% CI, −0.58 to −0.15, p=0.001) (high SOE for benefit).
  - Greater reduction in binge days per week than placebo, based on three low risk-of-bias RCTs (N= 122) (SMD, −0.57; 95% CI, −0.93 to −0.21, p < 0.001) (low SOE for benefit).
- As a class, antidepressants were associated with greater reductions in eating-related obsessions and compulsions, based on meta-analysis of three low risk-of-bias RCTs (N=122) (SMD, −0.58; 95% CI, −0.99 to −0.17, p=0.006, I^2 = 22 percent) (low SOE for benefit).
- As a class, antidepressants were associated with mixed weight outcomes, based on two measures:

- Not associated with greater reduction in BMI than placebo, based on six RCTs (N=297) (SMD, −0.15; 95% CI, −0.38 to 0.08, p=0.194) (low SOE for no difference).
- Greater reduction in weight than placebo, based on four RCTs (N=182) (SMD, −0.41; 95% CI, −0.74 to −0.07, p=0.017) (low SOE for benefit).

- As a class, antidepressants were associated with greater reduction in symptoms of depression than placebo, based on three RCTs (N=142) (SMD, −0.58; 95% CI, −0.92 to −0.24, p=0.001) (low SOE for benefit).

Table 8 documents the number of trials and numbers of subjects available as evidence for the meta-analyses of treatment benefits of antidepressants, as a class, for BED. The strength of evidence for any specific antidepressant was insufficient because, with the exception of fluoxetine, each drug was evaluated only in one, small sample, single trial (N range, 34 to 85).

Table 8. Strength of evidence for outcomes of meta-analysis of antidepressant interventions compared with placebo for binge-eating disorder

Treatment Comparison	Binge Eating	Eating-Related Psychopathology	Weight-Related Outcomes	Psychological Outcomes	Other Outcomes
Antidepressants (drug) vs. placebo, end of treatment, combined meta-analysis results	**High** 8 RCTs (N=416) Drug better, abstinence **High** 7 RCTs (N= 331) Drug better, reduction binge episodes/week **Low** 3 RCTs (N= 122) Drug better, reduction binge days/week	**Low** 3 RCTs (N=122) Drug better, reduction binge-eating related obsessions and compulsions	**Low** 6 RCTs (N=297) No difference, BMI **Low** 4 RCTs:182 Drug better, small weight loss	**Low** 3 RCTs (N=142) Drug better depression symptoms	Not available

N= number of subjects; RCT = randomized controlled trial

Detailed Synthesis

The results for the eight pharmaceutical trials are presented in relation to the four major outcomes of binge eating and abstinence, eating-related psychopathology, weight, and general psychological and other outcomes. No studies provided data on outcomes beyond the end of treatment. For each outcome, we present first the meta-analysis results followed by details of the individual studies. Because all these trials had only placebo controls, we do not repeat that "comparison" point in the text below.

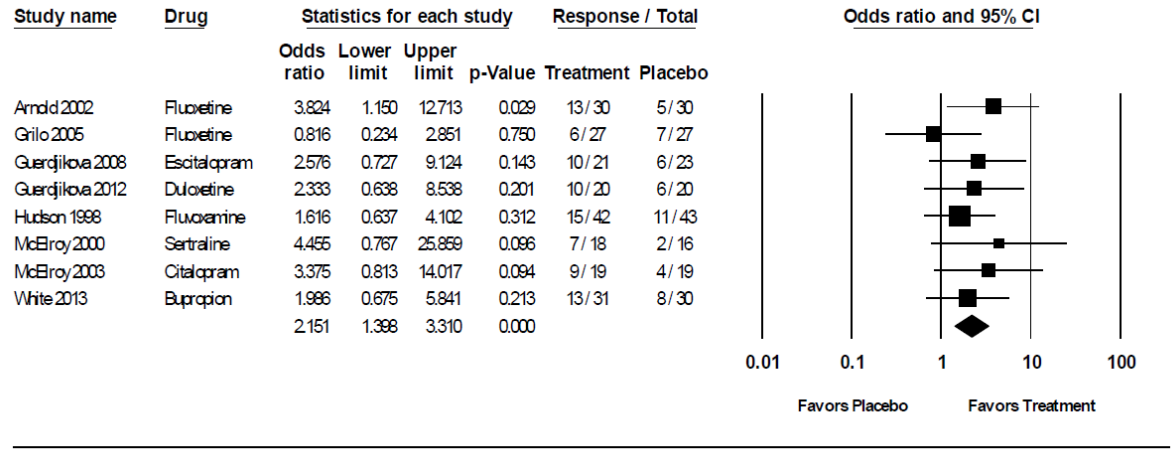
Binge-Eating Outcomes

Antidepressants: Meta-analysis Results

We conducted meta-analyses (using random effects models) to determine the efficacy of antidepressant medication in treating BED patients. Eight trials provided data sufficient for the analysis of binge abstinence; of these eight, seven provided data on binge episodes per week and three provided data on binge days per week. We conducted sensitivity analyses to evaluate the impact on the summary estimate of one high risk-of-bias fluvoxamine trial[85] that provided data on abstinence and binge days per week.

As shown in Figure 4, the odds of achieving abstinence were more than 2 times greater with antidepressants, as a class (OR, 2.15; 95% CI, 1.40 to 3.31, p < 0.001; I^2 = 0 percent). This finding was robust to the inclusion of data from the high risk-of-bias trial (OR, 2.16; 95% CI, 1.42 to 3.29, p<0.001, I^2 = 0 percent). On average, 41 percent of participants treated with second-generation antidepressants and 23 percent of participants treated with placebo achieved abstinence at the end of treatment.

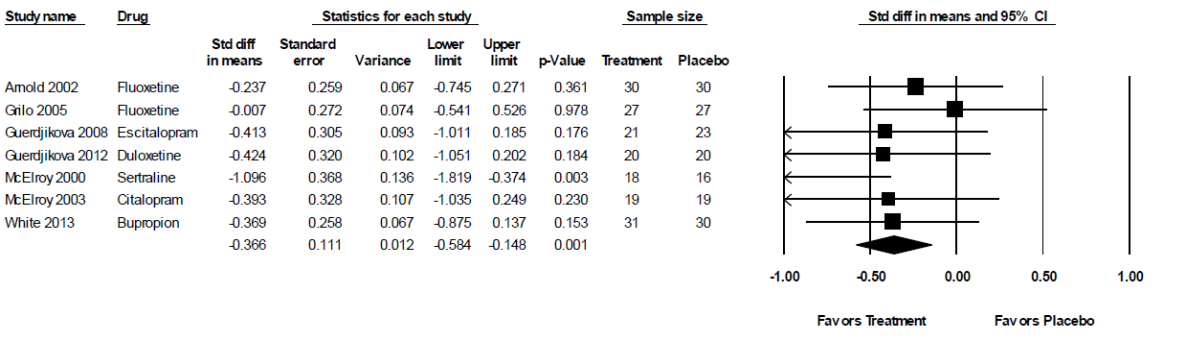
Figure 4. Abstinence: Antidepressants versus placebo



Random effects meta-analysis; I-sqaured 0%

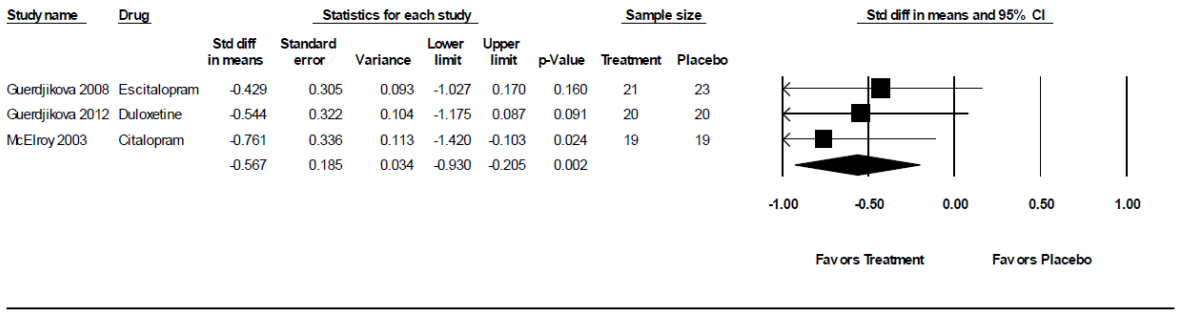
In addition, the antidepressants were more effective in reducing binge frequency, whether measured as binge episodes per week (6 trials, SMD, −0.37; 95% CI, −0.58 to −0.15, p=0.001, I^2 = 0 percent; Figure 5) or binge days per week (3 trials, SMD, −0.57; 95% CI, −0.93 to −0.21, p=0.001, I^2 = 0 percent (Figure 6). The sensitivity analysis supported the finding of an antidepressant benefit on binge days per week (SMD, −0.51; 95% CI, −0.84 to −0.17, p=0.003 I^2 = 0 percent]. Over the course of treatment, the weighted mean change in binge days per week was −3.0 among those treated with second-generation antidepressants and −2.0 among those treated with placebo; at the end of treatment, the weighted mean numbers of binge days per week were 1.0 and 1.9 in the two groups, respectively. Similarly, over the course of treatment, the weighted mean change in binge episodes per week was −3.6 among those treated with antidepressants and −2.7 receiving placebo; at the end of treatment, the weighted mean numbers of binge episodes per week were 1.5 and 2.1 in the two groups, respectively.

Figure 5. Binge episodes per week: Antidepressants versus placebo



Random effects meta-analysis; I-sqaured 0%

Figure 6. Binge days per week: Antidepressants versus placebo



Random effects meta-analysis; I-sqaured 0%

Antidepressants: Single Trial Results

This section describes the results of the eight placebo-controlled trials used for the meta-analyses described above.

Citalopram, 60 mg/day for 6 weeks, was associated with a significant change of approximately −1.2 binge days per week, although treatment did not achieve greater abstinence.[84] Escitalopram, 30 mg/day for 12 weeks, was associated with a significant change of approximately −0.3 binge episodes per week, although treatment was not associated with abstinence.[92] Fluoxetine, 80 mg/day for 6 weeks, was associated with a faster rate of reduction in the number of binges per week;[82] however, neither this regimen nor fluoxetine, 60 mg/day for 16 weeks,[131] was better than placebo in reducing binge frequency or achieving abstinence at the end of treatment. Fluvoxamine, 300 mg/day for 9 weeks, was associated with a faster rate of reduction in the number of binges per week; however, treatment did not achieve greater abstinence.[86] Sertraline, 200 mg/day for 6 weeks, was associated with a faster rate of reduction in the number of binges per week, but at the end of treatment the abstinence rate did not differ between groups.[83]

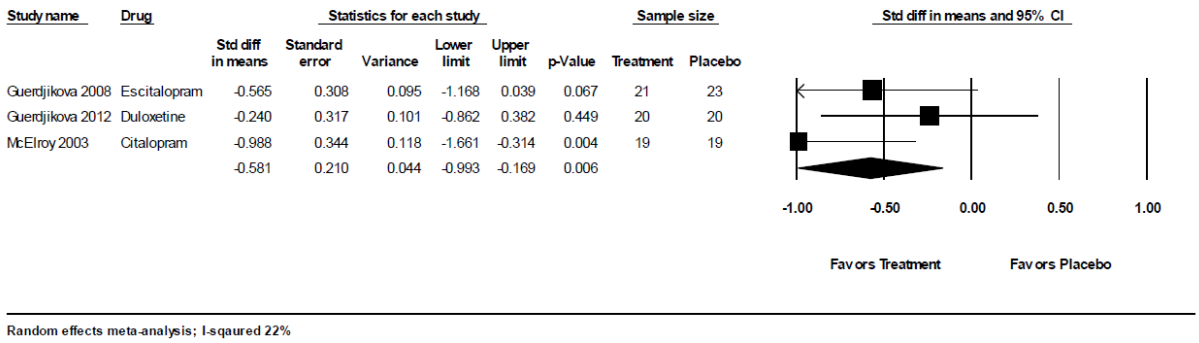
Other antidepressant trials included duloxetine and bupropion. Duloxetine (120 mg/day for 12 weeks) was associated with a faster rate of reduction in binges per week in longitudinal analysis; however, based on an endpoint analysis, the treatment groups did not differ significantly in binge frequency change from baseline to end of treatment.[90] Bupropion (300 mg/day for 8 weeks) was not more effective in reducing binge frequency than placebo.[132]

Eating-Related Psychopathology Outcomes

Antidepressants: Meta-analysis results

Three placebo-controlled trials assessed treatment-related changes in binge-eating-related obsessions and compulsions using the Yale-Brown Obsessions and Compulsions Scale (YBOCS-BE).[84,90,92] The estimated difference in change in obsessions and compulsions between antidepressants and placebo varied in magnitude but was consistent in direction across the three trials. Overall, antidepressants were associated with significant reductions in obsessions and compulsions (SMD, −0.58; 95% CI, −0.99 to −0.17, p=0.006, I^2 = 22 percent; Figure 7).

Figure 7. Total binge-eating related obsessions and compulsions: Antidepressants versus placebo



Antidepressants: Single Trial Results

Citalopram was associated with a significant change in the mean total YBOCS-BE score (−5.73) because of changes in subscale scores for obsessions (−2.48) and compulsions (−2.88).[84] In contrast to citalopram, the change in the mean total YBOCS-BE score was smaller (−2.9) and not statistically significant following 12 weeks of escitalopram treatment.[92] Neither fluoxetine, 60 mg/day for 16 weeks,[131] nor fluoxetine, 80 mg/day for 6 weeks,[82] had a significant effect on eating-related psychopathology, as measured by changes in the four Eating Disorder Examination Questionnaire (EDE-Q) subscales of cognitive restraint and eating, shape, and weight concerns,[131] or by changes in the Three-Factor Eating Questionnaire (TFEQ) subscales of hunger or disinhibition.[131] The effects of fluvoxamine or sertraline on eating-related psychopathology were not reported. Duloxetine was not better than placebo in reducing binge-related obsessions and compulsions or TFEQ measures of hunger, cognitive restraint, or disinhibition.[90] Similarly, bupropion did not significantly reduce food cravings, dietary restraint, or eating, shape, and weight concerns.[132]

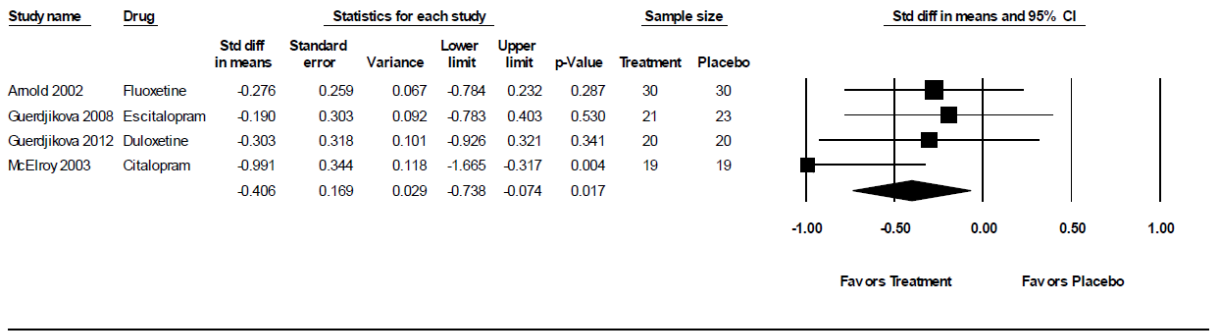
Weight Outcomes

Antidepressants: Meta-analysis Results

Four trials provided data on weight and six trials provided data on BMI; all were placebo-controlled. We also conducted a sensitivity analysis to evaluate the impact of one high risk-of-bias fluvoxamine trial[85] that reported weight data.

Treatment with an antidepressant was associated with a greater change in weight (kg) (SMD, −0.41; 95% CI, −0.74 to −0.07, p=0.017, I^2 = 20 percent); this finding was robust to the inclusion of data from the high risk-of-bias trial (SMD, −0.38; 95% CI, −0.66 to −0.10, p=0.008, I^2, 0.00) (Figure 8). The mean change in weight varied considerably across trials; the largest mean weight *loss* occurred in participants treated with duloxetine (2.8 kg).[90] Notably, in three of the four weight trials, the mean weight *increased* among participants receiving placebo, ranging from 0.6 kg[92] to 6.8 kg.[82] Thus, by the end of treatment, which ranged in duration from 6 to 12 weeks, participants treated with an antidepressant lost, on average, 0.9 pounds more than participants treated with placebo.

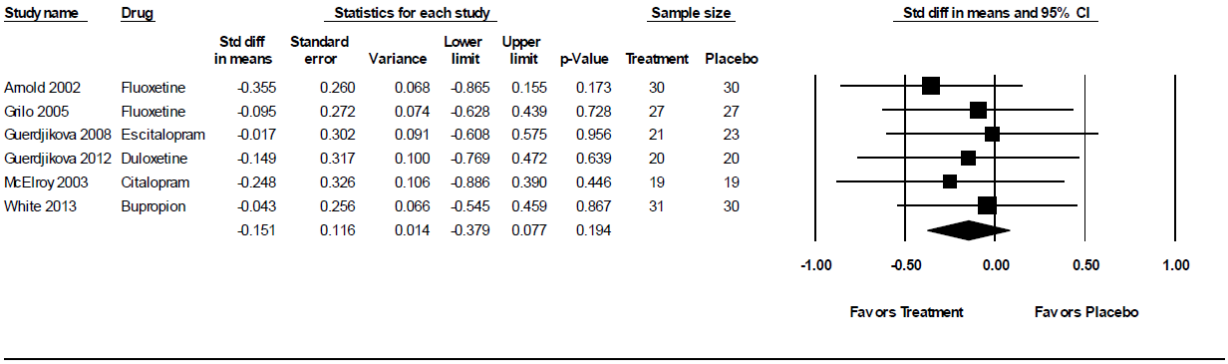
Figure 8. Weight: Antidepressants versus placebo



Compared with placebo, treatment with an antidepressant was not associated with a significant change in BMI (SMD, −0.15; 95% CI, −0.38 to 0.08, p=0.194, I^2 = 0 percent) (Figure 9). Although the point estimate for BMI reduction favored the treatment group receiving an antidepressant in each of the trials, estimates were not precise; all four 95% confidence intervals included no benefit.

In sum, treatment with antidepressants was associated with a small but statistically significant reduction in weight in individuals with BED. The apparent discrepancy between weight and BMI outcomes may be an artifact of the predominantly obese samples and the short treatment periods of the included trials; that is, a significant reduction in weight may not translate into a significant difference in BMI, especially in an obese sample, because a larger change is required to shift BMI than weight.

Figure 9. BMI: Antidepressants versus placebo



Antidepressants: Single Trial Results

Citalopram,[84] escitalopram,[92] and fluoxetine (80 mg/day)[82] significantly reduced weight and BMI. Similarly, fluvoxamine[86] and sertraline[83] were associated with a faster rate of decline in BMI. In contrast, weight was not significantly reduced following treatment with fluoxetine, 60 mg/day compared with placebo.[131] Duloxetine was associated with a faster rate of reduction in weight but did not lead to a significantly greater overall mean reduction in weight or BMI at the end of treatment than placebo.[90] Similarly, bupropion was associated with a faster rate of reduction in BMI; however, end-of-treatment differences in BMI reduction were not reported.[132]

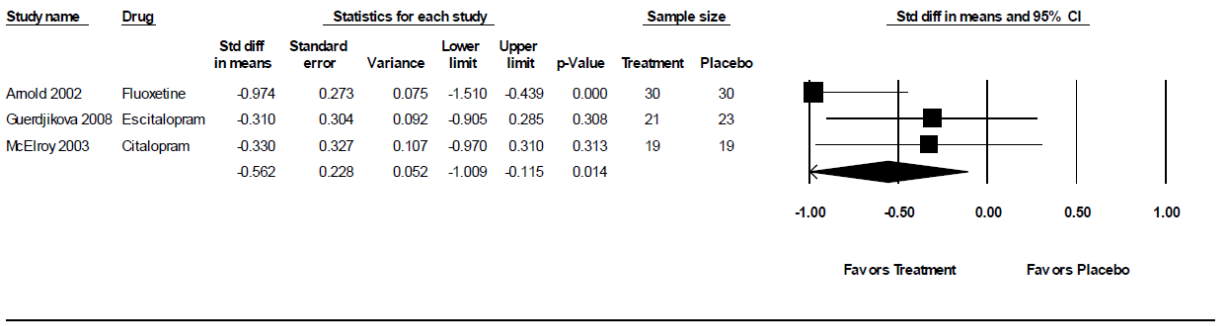
General Psychological Outcomes

Second-Generation Antidepressants: Meta-analysis Results

As shown in Figure 10, antidepressant treatment was associated with a greater change in symptoms of depression than placebo, based on three RCTs (SMD, −0.58; 95% CI, −0.92 to −0.24, p=0.001); however, we detected moderate heterogeneity across trials (I^2 = 42 percent). Only one of the three studies, high dose (80 mg/day) fluoxetine, individually found a significantly better benefit in the treatment arm.[82] This meta-analysis finding was robust to the inclusion of the high risk-of-bias trial (SMD, −0.59; 95% CI, −0.91 to −0.28 I^2 = 15 percent), p < 0.001).

All three trials measured depression symptoms using the Hamilton Depression Rating Scale; the score on the 17-item version score can range from 0 to 52. At baseline, mean scores ranged from 2.6 to 5.7, indicating that most participants in these trials had low levels of depression before starting treatment. Thus, treatment conferred a statistically significant but numerically small benefit in reducing symptoms of depression in mildly depressed patients with BED.

Figure 10. Depression: Second-generation antidepressants versus placebo



Antidepressants: Single Trial Results

Citalopram,[84] escitalopram,[92] fluoxetine (80 mg/day for 6 weeks),[82] fluvoxamine,[86] and sertraline[83] were associated with significant reductions in illness severity measured by the Clinical Global Impressions (CGI) scale. Similarly, global symptom improvement was significantly greater following treatment with fluvoxamine[86] and sertraline.[83] Duloxetine[90] but not bupropion[132] was associated with significantly greater reductions in depression symptoms; however, duloxetine was not better in reducing anxiety symptoms or global or binge-eating-specific symptom severity.[90]

Other Outcomes

Second-Generation Antidepressants: Meta-analysis Results

No meta-analyses were possible for other outcomes associated with antidepressant treatment for BED.

Antidepressants: Single Trial Results

One trial reported no differences at end of treatment between escitalopram and placebo in blood concentrations of hormones related to weight and appetite regulation (i.e., leptin, glucose,

insulin, ghrelin) or in blood lipid concentration (e.g., cholesterol).[92] No other outcomes of interest were reported (e.g., quality of life, self-esteem, anxiety).

Table 9 presents the details of the eight trials that provided evidence for the efficacy of antidepressant medications in BED.

Table 9. Binge-eating disorder treatment results: Outcomes of trials of antidepressant medications compared with placebo

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy et al., 2003[84] G1: Citalopram, 60 mg/day (19/16) G2: Placebo (19/15) 6 weeks ITT sample Mixed-model RMANOVA	Binges days/week, mean (SD) Pre-tx: G1: 4.0 (1.7) G2: 4.0 (1.5) Post-tx: G1: 1.2 (2.0) G2: 2.8 (2.2) Diff in change from baseline to week 6 (standardized at 4.0 binge days/wk): -1.2 (p=0.016) Nonstatistically sig diff in change over time: Binge episodes/week Abstinence	YBOCS-BE, mean (SD) Pre-tx: G1: 19.4 (4.2) G2: 18.5 (3.1) Post-tx: G1: 7.6 (7.2) G2: 13.2 (5.9) Diff in change from baseline to 6 wk: -5.73 (SE 2.33) (p=0.007) YBOCS-BE Obsessions, mean (SD) Pre-tx: G1: 9.3 (2.2) G2: 9.3 (1.8) Post-tx: G1: 4.3 (3.6) G2: 6.8 (2.6) Diff in change from baseline to 6 wk: -2.48 (SE 1.22) (p=0.041) YBOCS-BE Compulsions, mean (SD) Pre-tx: G1: 10.1 (2.2) G2: 9.2 (1.7) Post-tx: G1: 3.4 (3.9) G2: 6.4 (3.6) Diff in change from baseline to 6 wk: -2.88 (SE 1.27) (p=0.023)	Weight, mean (SD) Pre-tx: G1: 116.8 (21.0) G2: 94.6 (23.2) Post-tx: G1: 114.1 (22.4) G2: 99.8 24.7) Diff in change from baseline to 6 wk: -2.49 (SE 0.66) (p<0.001) BMI, mean (SD) Pre-tx: G1: 41.4 (6.9) G2: 34.2 (7.4) Post-tx: G1: 40.9 (7.0) G2: 35.7 (7.5) Diff in change from baseline to 6 wk: -0.818 (SE 0.254) (p=0.001)	Nonstatistically sig diff in change over time: HAM-D CGI-S

Table 9. Binge-eating disorder treatment results: Outcomes of trials of antidepressant medications compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Guerdjikova et al., 2008[92] G1: Escitalopram, 30 mg/day (21/17) G2: Placebo (23/19) 12 weeks ITT sample Mixed-model RMANOVA	Binge episodes/week, mean (SD) Pre-tx: G1: 4.9 (2.6) G2: 5.1 (2.3) Post-tx: G1: 0.9 (1.4) G2: 1.7 (1.5) Estimate between group diff in change from baseline to final visit (95% CI) = -0.31 (-0.52,0.03), t=2.17 (p=0.036) Binges days/week, mean (SD) Pre-tx: G1: 4.0 (1.7) G2: 4.1 (1.5) Post-tx: G1: 0.9 (1.4) G2: 1.6 (1.4) Estimate between group diff in change from baseline to final visit (95% CI) = -0.31 (-0.52,0.01), t=2.10 (p=0.042) Nonstatistically sig diff in change over time: Estimate between group diff in change in binge episodes/week over 12 weeks Estimate between group diff in change in binge days/week over 12 weeks Abstinence	Nonstatistically sig diff in change over time: YBOCS-BE total YBOCS-BE obsessions YBOCS-BE compulsions	Weight (kg), mean (SD) Pre-tx: G1: 113.0 (SD 20.0) G2: 109.2 (SD 17.2) Post-tx: G1: 112.0 (SD 20.0) G2: 109.8 (SD 17.8) Estimate between-group difference in 12-week change (95% CI): 2.1 (0.8, -3.4), X^2=8.41 (p=0.002) Estimate between-group difference in change from BL to final visit (95% CI): 1.7 (0.1, -3.2), t=3.14 (p=0.037) BMI Pre-tx: G1: 40.1 (SD 6.8) G2: 40.3 (SD 4.8) Post-tx: G1: 40.4 (SD 7.0) G2:40.5 (SD 5.0) Estimate between-group difference in 12-week change (95% CI): 0.7 (0.3, -1.2), chi-square: 8 (p=0.003) Estimate between-group difference in change from BL to final visit (95% CI): 0.6 (0.0, -1.1), t= 2.03 (p=0.048)	CGI-severity, mean (SD) Pre-tx: G1: 4.8 (SD 0.7) G2: 4.7 (SD 0.7) Post-tx: G1: 2.3 (SD 1.3) G2: 3.2 (SD 1.4) Estimate between-group diff in 12-week change (95% CI): 0.9 (0.1, -1.8), X^2=4.56 (p=0.029) Estimate between-group diff in change from BL to final visit (95% CI): 1.0 (0.1, -1.9), t=2.56 (p=0.026) Nonstatistically sig diff in change over time: HAM-D Insulin Glucose Leptin Ghrelin LDL Cholesterol Total cholesterol

Table 9. Binge-eating disorder treatment results: Outcomes of trials of antidepressant medications compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment duration (Length of Post-tx Followup) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Arnold et al., 2002[82] G1: Fluoxetine, 80 mg/day (30/23) G2: Placebo (30/13) 6 weeks ITT sample Mixed-model RMANOVA	Binges/week, mean (SD) Pre-tx: G1: 6.0 (2.5) G2: 6.1 (4.8) Post-tx: G1: 1.8 (2.9) G2: 2.7 (3.8) Diff in rate of change over time (time trend analysis) (p=0.033) Nonstatistically sig diff in change over time: Binges/week in change from baseline to 6 wk (endpoint analysis) Abstinence	NR	Weight, kg, mean (SD): Pre-tx: G1: 110.4 (24.1) G2: 103.5 (19.0) Post-tx: G1: 112.5 (25.0) G2: 110.3 (18.2) Diff in rate of change over time (time trend analysis (p=0.001) Diff in change from baseline to 6 wk (endpoint analysis) (p<0.0001) BMI, kg/m², mean(SD): Pre-tx: G1: 39.6 (7.0) G2: 36.7 (6.8) Post-tx: G1: 40.0 (7.2) G2: 39.5 (6.3) Diff in rate of change over time (time trend analysis) (p<0.0001) Diff in change from baseline to 6 wk (endpoint analysis) (p<0.0001)	CGI-S, mean (SD): Pre-tx: G1: 4.2 (0.4) G2: 4.3 (0.6) Post-tx: G1: 2.2 (1.4) G2: 3.3 (1.4) Diff in rate of change over time (time trend analysis) (p=0.032) Diff in change from baseline to 6 wk (endpoint analysis) (p= 0.012) HAM-D, mean (SD): Pre-tx: G1: 4.8 (4.3) G2: 4.2 (2.9) Post-tx: G1: 2.6 (3.0) G2: 5.5 (4.1) Diff in change from baseline to 6 wk (endpoint analysis) (p=0.003) Nonstatistically sig diff in change over time: HAM-D rate of change over time

Table 9. Binge-eating disorder treatment results: Outcomes of trials of antidepressant medications compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[131] G1: Fluoxetine, 60 mg/day (27/21) G2: Placebo (27/23) (Note: 2 other CBT arms presented in results section on combination treatments) 16 weeks ITT sample ANCOVA Logistic regression	Nonstatistically sig diff in change over time: Binges/week (diary) Binge episodes/mo Abstinence	Nonstatistically sig diff in change over time: EDE-Q Global and 4 subscales TFEQ-hunger TFEQ-disinhibition BSQ-body dissatisfaction	Nonstatistically sig diff in change over time: BMI	Nonstatistically sig diff in change over time: BDI
Hudson et al., 1998[86] G1: Fluvoxamine, 300 mg/day (42/29) G2: Placebo (43/38) 9 weeks ITT sample Mixed-model RMANOVA	Binges/week (diary; data in graph form only) Diff in rate of change over time, t=2.77, G1 > G2 (p=0.006) Nonstatistically sig diff in change over time: Abstinence	NR	BMI week (data in graph form only) Diff in rate of change over time, t=2.02, G1 > G2 (p=0.04)	CGI-Improvement (data in graph form only) Diff in rate of change over time, t=2.25, G1 > G2 (p=0.02) CGI-Severity (data in graph form only) Diff in rate of change over time, t=3.08, G1 > G2 (p=0.002) Nonstatistically sig diff in change over time: HAM-D

Table 9. Binge-eating disorder treatment results: Outcomes of trials of antidepressant medications compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy et al., 2000[83] G1: Sertraline, 200 mg/day (18/13) G2: Placebo (16/13) 6 weeks ITT sample Repeated measures random regression	Binges/wk (diary), mean (SD) Pre-tx: G1: 7.6 (4.8) G2: 7.2 (5.8) Post-tx: G1: 1.13 (1.56) G2: 3.85 (3.81) Diff in rate of change over time, X^2=7.30, G1 > G2 (p=0.008) Nonstatistically sig diff in change over time: Abstinence	NR	BMI Diff in rate of change over time, X^2=9.89, G1 > G2 (p=0.002)	CGI Improvement Diff in rate of change over time, X^2=16.30, G1 > G2 (p<0.001) CGI Severity Diff in rate of change over time, X^2=30.30, G1 > G2 (p<0.001) Nonstatistically sig diff in change over time: HAM-D
White and Grilo, 2013[132] G1: Bupropion, 300 mg/day (31/27) G2: Placebo (30/27) 8 weeks m-ITT Mixed effects regression for continuous outcomes	Nonstatistically sig diff in change over time: Binges past 28 days Abstinence	Nonstatistically sig diff in change over time: EDE Global and 4 subscales FCI	% BMI loss G1: 1.8% G2: 0.6% Diff: (p< 0.001)	Nonstatistically sig diff in change over time: BDI

Table 9. Binge-eating disorder treatment results: Outcomes of trials of antidepressant medications compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Guerdjikova et al., 2012[90] G1: Duloxetine, 120 mg/day (20/13) G2: Placebo (20/14) 12 weeks ITT sample Repeated measures random regression	Binge days/wk, mean (SD) Pre-tx: G1: 4.0 (1.8) G2: 3.5 (1.5) Post-tx: G1: 1.0 (1.7) G2: 1.3 (1.2) Diff in change over time: (p=0.04) Binge episodes/wk, mean (SD) Pre-tx: G1: 4.5 (2.0) G2: 4.0 (2.4) Post-tx: G1: 1.1 (1.0) G2: 1.3 (1.2) Diff in change over time: (p=0.02) Nonstatistically sig diff: Abstinence	Nonstatistically sig diff in change over time: YBOCS-BE total and 2 subscales TFEQ 3 subscales	Weight, kg, mean (SD) Pre-tx: G1: 111.1 (24.1) G2: 118.3 (23.1) Post-tx: G1: 108.3 (23.8) G2: 118.0 (23.2) Diff in change over time: (p=0.04) Nonstatistically sig diff in change over time: BMI	CGI Severity, mean (SD) Pre-tx: G1: 5.0 (0.8) G2: 4.6 (0.7) Post-tx: G1: 2.3 (1.5) G2: 2.7 (1.3) Diff in change over time: (p=0.02) CGI Severity for Depressive Disorders, mean (SD) Pre-tx: G1: 4.3 (0.7) G2: 4.2 (0.7) Post-tx: G1: 2.3 (1.3) G2: 2.9 (1.0) Diff in change over time: (p=0.01) Nonstatistically sig diff in change over time: Inventory of Depressive Symptoms HAM-A

ANCOVA = analysis of covariance; BDI = Beck Depression Inventory; BE = binge-eating; BMI = body mass index; CGI-I = Clinical Global Impressions-Improvement scale; CGI-S = Clinical Global Impressions-Severity of Illness scale; diff = difference; DSM = Diagnostic and Statistical Manual for Mental Disorders; EDE = Eating Disorder Examination; EDE-Q = Eating Disorder Examination Questionnaire; FCI = Food Craving Inventory; G = group; HAM-A = Hamilton Anxiety scale; HAM-D = Hamilton Depression Rating Scale (a.k.a., Hamilton Rating Scale for Depression); IBW = ideal body weight; IDS-C = Inventory of Depressive Symptomatology; ITT = intent to treat; IV = fourth edition; kcal = kilocalories; kg = kilogram; MDD = Major Depressive Disorder; m-ITT = modified intent to treat; RCT = randomized controlled trial; mg = milligrams; mo = months; N=number; NR = not reported; OBE = objective binge episode; RMANOVA = repeated measured analysis of variance; SDRS = Self Depression Rating Scale; SBE = subjective binge episode; SD = standard deviation; SUD = substance use disorder; TFEQ = Three-Factor Eating Questionnaire; TR = Text Revision; tx = treatment; US = United States; wk = week; YBOCS = Yale-Brown Obsessive Compulsive Scale

Pharmacological Interventions: Antidepressant Comparisons with Other Active Interventions

Description of Studies

One trial involved a head-to-head trial comparison of two second-generation antidepressants (Table 10). That trial, which took place in a single outpatient primary care site in Italy, compared 8 weeks of treatment with either fluoxetine or sertraline in 42 obese women, mean age 39.6 years, with DSM-IV BED.[88].

Table 10. Characteristics of included intervention studies of antidepressants for BED

Author, Year Country Funding source Setting Design Risk of bias	Diagnosis (diagnostic method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key inclusion criteria Key Characteristics	Intervention Comparator Co-interventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (If Any)
Leombruni, 2008[88] Italy Outpatient RCT Medium	DSM-IV TR G1: 20 G2: 22 6 months Female, BMI ≥ 30 Mean age: 39.6 Mean BMI:39.3	G1: Fluoxetine: 10 mg/day titrated up every 3 days to flexible dose range, 40 to 80 mg/day [mean (SD) = 64.5 (9.9)] G2: Sertraline: 25 mg/day titrated up every 3 days to flexible dose range, 100 to 200 mg/day [mean (SD) = 165.9 (32.3) Co-interventions: none	Binge • Binges/week • Abstinence Eating-related • BES • EDI-2, 11 subscales Psychological • CGI • BDI Weight • Weight • BMI

BDI = Beck Depression Inventory; BES = Binge Eating Scale; BMI = body mass index; CGI = Clinical Global Impressions scale; DSM-IV-TR = Diagnostic and Statistical Manual for Mental Disorders, fourth edition, text revision; EDI = Eating Disorder Inventory; G = group; RCT = randomized controlled trial; mg = milligrams; SD = standard deviation

Key Points

- The strength of evidence is insufficient to determine the comparative effectiveness of sertraline and fluoxetine for any outcome because evidence was limited to one small trial.

Detailed Synthesis

Fluoxetine treatment using a flexible dose of 40 to 80 mg/day for 8 weeks was compared with sertraline treatment using a flexible dose of 100 to 200 mg/day for 8 weeks.[88] Assessments were conducted at baseline and at the end of treatment and at 4 and 16 weeks after treatment ended. Both antidepressants were associated with improvements in all outcomes including binge frequency, body dissatisfaction, weight, symptoms of depression, and others. None of the outcomes, however, differed significantly between the two medications groups.

Pharmacological Interventions: Antidepressant Comparisons with Behavioral Interventions

No trials compared a single antidepressant with a single behavioral treatment. See "Combination Therapy Interventions" below for results from trials involving combined pharmacological and behavioral treatments.

Pharmacological Interventions: Anticonvulsant Comparisons with Placebo

Description of Studies

The evidence about anticonvulsant treatment of BED consisted of three RCTs (Table 11); two involved topiramate[93,134] and one lamotrigine.[135] All three were placebo-controlled. All three focused on adults ranging in age from 18 to 65 years (mean range 40.8 to 44.5). Most participants were obese (mean BMI range: 38.5 to 44.3), female (76 percent to 87 percent), and white (78 percent and 80 percent; not reported in one trial). Overall, a total of 519 individuals were randomized to treatment.

One placebo-controlled RCT of zonisamide was deemed high risk-of-bias and used only for sensitivity analyses.[122]

Table 11. Characteristics of included intervention trials of anticonvulsants for Binge-Eating Disorder

Author, Year Country Funding source Setting Design Risk of Bias	Diagnosis (diagnostic method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
McElroy, 2003[93] USA Outpatient RCT Medium	DSM IV TR (SCID) G1: 30 G2: 31 14 wk (2 wk) 18-60 yr., BMI ≥ 30, YBOCS-BE ≥ 15 Mean age: 40.8 Mean weight: 121.9 kg Mean BMI: NR* % Female: 87 % Nonwhite: NR Current mood disorder: 15% *missing for G2	G1: **Topiramate**, 25 mg/day titrated up to max 600 mg/day by wk 10, median dose = 212 mg/day G2: **Placebo**, median dose = 362 mg/day Co-interventions: none	Binge • Binges episodes/wk • Binge days/wk • Abstinence Eating-related • YBOCS-BE • TFEQ Psychological • CGI Weight • Weight • BMI • WHR Other • BP • Appetite hormones • Blood lipids

Table 11. Characteristics of included intervention trials of anticonvulsants for Binge-Eating Disorder (continued)

Author, Year Country Funding source Setting Design Risk of Bias	Diagnosis (diagnostic method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
McElroy, 2007[134] USA Outpatient RCT Low	DSM-IV (SCID-I/P, EDE) G1: 195 G2: 199 16 wk 18-65 yr., BMI: 30-50, ≥ 3 binge-eating episodes and ≥ 2 binge days in the screening week Mean age: 44.5* Mean weight: 106.5 kg* Mean BMI: 38.5* % Female: 84.2* % Nonwhite: 21.5* *based on safety population (n=404)	G1: **Topiramate**, 25 mg/day titrated to 100 mg/day by wk 4 then up to 400 mg/day by wk 8, median dose = 300 mg/day G2: **Placebo,** median dose = 400 mg/day Co-interventions: none	Binge • Binges episodes/wk • Binge days/wk • Abstinence Eating-related • BIS • TFEQ • YBOCS-BE Psychological • CGI • HDRS • MADRS Weight • Weight • BMI • WHR Other • SDS
Guerdjikova, 2009[135] USA Outpatient RCT Medium	DSM-IV (SCID) G1: 26 G2: 25 16 wk Female, 18-50 yr. Mean age: 44.5 Mean weight: 112.8 kg Mean BMI: 40.1 % Female: 76.5 % Nonwhite: 80.0 Current depressive disorders: 37.2%	G1: **Lamotrigine**, 25 mg/day for 2 wks, titrated up to 50 mg/day for 2 wks then to 100 mg/day for 2 wks, as tolerated; increased to 300 mg/day if inadequate response by wk 6 and 400 mg/day if inadequate response by wk 8; mean (SD) flexible dose = 236+/-150 mg/day). G2: **Placebo** Co-interventions = none	Binge • Binges episodes/wk • Binge days/wk • Abstinence Eating-related • EDE • YBOCS-BE • TFEQ Psychological • BIS • CGI • BDI • MADRS Weight • Weight • BMI Other • SDS

BDI = Beck Depression Inventory; BIS = Barrat Impulsivity Scale; BMI = body mass index; CGI = Clinical Global Impression scale; DSM = Diagnostic and Statistical Manual for Mental Disorders; EDE = Eating Disorder Examination; HDRS = Hamilton Depression Rating Scale (a.k.a. HAM-D); IV = fourth edition; RCT = randomized controlled trial; MADRS = Montgomery-Asberg Depression Rating Scale; mg = milligrams; mo = months; N=number; NR = not reported; RCT = randomized controlled trial; SD = standard deviation; SDS = Sheehan Disability Scale; TFEQ = Three-Factor Eating Questionnaire; TR = Text Revision; tx = treatment; USA = United States of America; WHR = waist-to-hip ratio; wk = week

Key Points

- Based on two trials with a combined sample exceeding optimal information size (n=468), topiramate was associated with:

- a greater percentage of participants abstinent and with greater reductions in binge eating, binge-eating related obsessions and compulsions, weight, and global symptoms (moderate SOE for benefit).
- greater reductions in susceptibility to hunger, disinhibition of control over eating, impulsivity, and disability in family and social domains (low SOE for benefit).

- The strength of evidence is insufficient to determine the efficacy of topiramate on other outcomes such as blood pressure and appetite hormones, which were evaluated in one small trial.
- The strength of evidence is insufficient to determine the efficacy of lamotrigine, which was evaluated in one small trial.

Table 12. Strength of evidence for outcomes of anticonvulsant interventions compared with placebo for binge-eating disorder

Treatment Comparison	Binge Eating	Eating-Related psychopathology	Weight	Psychological Outcomes	Other Outcomes
Topiramate vs. placebo	**Moderate** 2 RCTs (N=468) Topiramate better for reducing binge frequency and achieving abstinence	**Moderate** 2 RCTs (N=468) Topiramate better reductions in obsessions and compulsions **Low** 1 RCT (N=407) Topiramate better reductions in cognitive restraint, hunger, disinhibition	**Moderate** 2 RCTs (N=468) Topiramate better Reductions in weight and BMI	**Moderate** 2 RCTs (N=468) Topiramate better reductions in global symptoms;	**Low** 1 RCT (N=407) Topiramate better reductions in social and family disability, impulsivity **Insufficient** 1:61 Topiramate better reduction in DBP

N= number; RCT = randomized controlled trial; vs. = versus

Detailed Synthesis

The three anticonvulsant trials were fairly similar in duration of treatment; two implemented active treatment (60 mg/day) for 16 weeks[134,135] and one for 14 weeks.[93] None reported any follow-up assessments beyond the end of treatment. All three trials used the same analytic method (mixed-model repeated measures analysis of variance (RMANOVA); the investigators reported outcomes as both change from baseline to endpoint and as rate of change over the course of treatment. For the two topiramate trials, dose was 60 mg/day.[93,134] All three trials assessed binge frequency and abstinence, weight and BMI, and binge-eating related obsessions and compulsions. Additional outcomes, such as symptoms of depression, global illness severity, disinhibition, and restraint were inconsistently reported by these research teams.

Binge-Eating Outcomes

We conducted a meta-analysis to determine the efficacy of anticonvulsants, as a class, for binge abstinence in patients with BED. The degree of inconsistency across the three trials was extreme (I^2 = 83 percent); for that reason, we rely on the qualitative analysis to describe our findings here.

Topiramate was associated with a faster rate of reduction in binge frequency and a greater overall reduction in binge frequency from baseline to end of treatment.[93,134] Both trials found a significant difference in binge response to treatment; the percentage of participants achieving abstinence was greater with topiramate (for topiramate versus placebo: 58 percent versus 29 percent[134] and 64 percent versus 30 percent[93]). In contrast, neither the rate of reduction in binge

frequency nor the percentage of participants achieving abstinence at the end of treatment differed significantly between lamotrigine and placebo groups.[135]

Weight Outcomes

Topiramate was associated with a faster rate of reduction in weight and in BMI and greater overall reductions in weight and BMI from baseline to end of treatment.[93,134] The mean weight loss was approximately 3-fold greater with topiramate (for topiramate versus placebo: −4.5 kg versus −0.2 kg[134] and −5.9 kg versus -1.2 kg[93]).

Neither the rate of reduction in weight or BMI nor the overall reduction in weight or BMI from baseline to end of treatment were differed significantly between lamotrigine and placebo groups.[135]

Eating-Related Psychopathology

Compared with placebo, topiramate was associated with a faster rate of reduction in binge-related obsessions and compulsions, as indexed by the YBOCS-BE, and a greater overall reduction in mean levels of obsessions and compulsions.[93,134] As reported in one trial, the mean reductions in obsessions (−6.7) and compulsions (−7.6) were nearly 2-fold greater with topiramate compared with placebo (−3.8 and −4.2, respectively).[93] In contrast, neither the rate of reduction in obsession or compulsions nor the overall reduction in obsessions or compulsions from baseline to end of treatment differed significantly between medication and placebo groups.[135]

Two trials reported changes in disinhibition, hunger, and restraint using the TFEQ. Compared with placebo, topiramate[134] but not lamotrigine[135] was associated with approximately a 2-fold greater increase in cognitive restraint and 2-fold greater reductions in disinhibition and hunger. Lamotrigine treatment also did not result in greater improvements in eating-related psychopathology.

General Psychopathology

In two of the placebo-controlled trials,[93,134] topiramate treatment was associated with significantly faster rate of reduction in global symptom severity, as measured by the CGI scale; as a result, as reported in one trial,[93] overall symptom improvement at end of treatment was greater with topiramate. Topiramate treatment was also associated with significant reductions in nonplanning and motor impulsivity as well as disability, particularly in social and family life domains.[134]

Neither topiramate[93,134] nor lamotrigine[135] was effective in reducing symptoms of depression.

Other Outcomes

Lamotrigine[135] but not topiramate[93] was associated with significantly greater reductions in insulin, glucose, and triglyceride levels. Notably, in the lamotrigine trial, over 16 weeks, mean glucose level increased 8.2 mg/dL in participants receiving placebo.[135] Neither treatment was more effective than placebo in reducing cholesterol, and lamotrigine was not more effective in reducing leptin or ghrelin levels.

Table 13. Binge-eating disorder treatment results: Outcomes of included anticonvulsant medication trials

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy, 2003[93] G1: Topiramate G2: Placebo 61(35) 14 weeks ITT Mixed-model RMANOVA	Binge episodes/wk: % reduction: G1: 94% G2: 46% (p < 0.02) Mean (SE) diff in rate of change over time, −0.276 (0.077) (p=0.0004) Binge days/wk: % reduction G1: 93% G2: 46% (p < 0.02) Mean (SE) diff in rate of change over time, −0.279 (0.070) (p < 0.0001) Abstinence: G1: 64% G2: 30% (p < 0.02)[a]	YBOCS-BE total Mean (SE) diff in rate of change over time, −2.55 (0.89) G1 > G2 (p=0.004) YBOCS-BE obsessions Mean (SE) diff in rate of change over time, −1.00 (0.46) G1 > G2 (p=0.04) YBOCS-BE compulsions Mean (SE) diff in rate of change over time, −1.55 (0.46) G1 > G2 (p=0.0008)	BMI Mean (SE) diff in rate of change over time, −0.54 (0.182) G1 > G2 (p=0.003) Weight: Mean (SE) diff in rate of change over time, −3.2 (1.15) G1 > G2 (p=0.005) Weight loss (completers only), mean (SD) G1: 5.9 kg G2: 1.2 kg (p=NR)	CGI severity Mean (SE) diff in rate of change over time, −0.413 (0.168) G1 > G2 (p=0.02) CGI improvement, end of tx (data=NR): G1 > G2 (p=0.01) DBP: G1: −2.71 mmHg G2: +0.47 mmHg Diff in change over time (p=0.04) Nonstatistically sig diff between groups in change over time: HDRS Insulin Glucose LDL cholesterol Total cholesterol Triglycerides
McElroy, 2007[134] G1: **Topiramate** G2: **Placebo** 407(283) 16 weeks ITT Mixed-model RMANOVA	Change in binge days/wk, mean (SD) G1: −3.5 (1.9) G2: −2.5 (2.1) Diff in change over time (p < 0.001) Change in binge episodes/wk, mean (SD) G1: −5.0 (4.3) G2: −3.4 (3.8) Diff in change over time (p < 0.001)	YBOCS-BE-Total G1: −14.3 (8.9) G2: −7.9 (8.9) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −3.154 (0.352) (p < 0.001) YBOCS-BE-Obsessions G1: -6.7 (4.6) G2: -3.8 (4.8) Diff in change over time (p < 0.001)	Weight, kg, mean (SD) G1: −4.5 (5.1) G2: −0.2 (3.2) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −1.995 (0.165) (p < 0.001) BMI, mean (SD) G1: −1.6 (1.8) G2: −0.1 (1.2)	CGI severity G1: -2.2 (1.6) G2: -1.1 (1.4) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −1.995 (0.165) (p < 0.001) BIS Overall Score G1: -3.9 (9.0) G2: -1.4 (7.9) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −0.980 (0.322) (p=0.003)

Table 13. Binge-eating disorder treatment results: Outcomes of included anticonvulsant medication trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy, 2007[134] (continued)	Abstinence G1: 58% G2: 29% (p < 0.001)[a]	Mean (SE) diff in rate of change over time, −1.527 (0.178) (p < 0.001) YBOCS-BE-Compulsions G1: -7.6 (4.8) G2: -4.2 (4.8) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −1.621 (0.191) (p < 0.001) TFEQ - Cognitive restraint G1: 3.5 (4.5) G2: 1.6 (4.5) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, 0.837 (0.171) (p < 0.001) TFEQ - Disinhibition G1: -5.0 (4.7) G2: -2.0 (3.5) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −1.310 (0.161) (p<0.001)	Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −0.712 (0.059) (p < 0.001)	BIS Motor Impulsiveness G1: -1.8 (3.8) G2: -0.9 (3.7) Diff in change over time (p=0.004) Mean (SE) diff in rate of change over time, −0.340 (0.142) (p=0.006) BIS Nonplanning Impulsiveness G1: -1.6 (4.5) G2: 0.01 (3.7) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −0.608 (0.149) (p < 0.001) SDS Overall score G1: -6.8 (7.6) G2: -4.9 (7.6) Diff in change over time (p=0.001) Mean (SE) diff in rate of change over time, −1.072 (0.266) (p < 0.001) SDS Social life disability G1: -2.6 (3.2) G2: -1.7 (3.1) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −0.459 (0.105) (p < 0.001)

Table 13. Binge-eating disorder treatment results: Outcomes of included anticonvulsant medication trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy, 2007[134] (continued)		TFEQ – Hunger G1: -4.5 (4.6) G2: -1.9 (4.1) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −1.156 (0.167) (p < 0.001)		SDS Family life disability G1: -2.7 (3.0) G2: -1.8 (2.9) Diff in change over time (p < 0.001) Mean (SE) diff in rate of change over time, −0.459 (0.104) (p < 0.001) Nonstatistically sig diff change over time: BIS Attentional Impulsiveness HAM-A MADRS SDS school/work disability
Guerdjikova, 2009[135] G1: **Lamotrigine** G2: **Placebo** 51(31) 16 weeks ITT Mixed-model RMANOVA	Nonstatistically sign diff in change over time: Binges/wk Binge days/wk	Nonstatistically sig diff in change over time: EDE-Q global and 4 subscales EOQ TFEQ total and 3 subscales YBOCS-BE total and 2 subscales	Nonstatistically sig diff in change over time: Weight BMI	Insulin, µU/mL, mean (SD) Mean diff from baseline to end of tx in completers: G1: −3.7 G2: +1.5 (p=0.010) Glucose, mg/dL, mean (SD) Diff in completers at endpoint: Mean diff from baseline to end of tx in completers: G1: −4.8 G2: +8.2 (p=0.027) Triglycerides, mg/dL, mean (SD) Mean diff from baseline to end of tx in completers: G1: −33.0 G2: +1.1 (p=0.015)

Table 13. Binge-eating disorder treatment results: Outcomes of included anticonvulsant medication trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Guerdjikova, 2009[135] (continued)				Nonstatistically sig diff in change over time: CGI-severity MADRS BIS total and 3 subscales SDS Total cholesterol HDL cholesterol LDL cholesterol Leptin Ghrelin

[a] p value for test across response categories ('none'; 'moderate'; 'marked'; 'remission' defined as cessation of binges, thus renamed 'abstinence' per this review)

BDI = Beck Depression Inventory; BIS = Barrat Impulsivity Scale; BMI = body mass index; CGI = Clinical Global Impression scale; diff = difference; dL = deciliter; DSM = Diagnostic and Statistical Manual for Mental Disorders; EDE = Eating Disorder Examination; HAM-A = Hamilton Anxiety scale; HDL = high density lipoprotein; HDRS = Hamilton Depression Rating Scale (a.k.a. HAM-D); IV = fourth edition; LDL = low density lipoprotein; mL = milliliter; µU/mL = microunits; RCT = randomized controlled trial; MADRS = Montgomery-Asberg Depression Rating Scale; mg = milligrams; mo = months; N=number; NR = not reported; RCT = randomized controlled trial; SD = standard deviation; SDS = Sheehan Disability Scale; sig = significant; TFEQ = Three-Factor Eating Questionnaire; TR = Text Revision; tx = treatment; USA = United States of America; WHR = waist-to-hip ratio; wk = week; YBOCS-BE = Yale-Brown Obsessions and Compulsiosn Scale modified for binge-eating

Pharmacological Interventions: Other Medications Compared with Placebo

Description of Studies

The included evidence about other pharmacological interventions used for treating patients with BED consisted of four placebo-controlled RCTs (Table 14).No trial had an active comparator. One trial each investigated the following: the sulfonic acid acamprosate, which is a mixed $GABA_A$ receptor agonist/NMDA receptor antagonist;[136] the µ-opioid antagonist ALKS-33 (also known as samidorphan);[137] the norepinephrine reuptake inhibitor atomoxetine;[91] and the dietary supplement chromium picolinate.[138] Chromium picolinate was studied at two dose levels: moderate (600 µg/day) and high (1000 µg/day).

Table 14. Characteristics of included trials of other medications compared with placebo

Author, Year Country Funding Source Setting Design Risk of Bias	Diagnosis (diagnostic method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
McElroy, 2011[136] USA Outpatient RCT Medium	DSM IV TR (SCID) G1: 20 G2: 20 10 wk 18-65 yr., weighed ≥ 85% of the midpoint of IBW for height, ≥ 3 binge-eating episodes and ≥ 2 binge days in the screening week Mean age: 46 Female: 85% Nonwhite: 12.5% Mean weight: 112.1 kg Mean BMI: 39.5 Lifetime depression: 22.5%	G1: Acamprosate: 666 mg 3 times/day for 2 wk, titrated up to minimum 999 mg/day and max 2,997 mg/day G2: Placebo Co-interventions = none	Binge • Binge episodes/wk • Binge days/wk Eating-related • YBOCS-BE total, 2 subscales • FCI • TFEQ total, 3 subscales Psychological • MADRS • SF-12 Mental Health Weight • Weight • BMI
McElroy, 2013[137] USA Outpatient RCT Medium	DSM-IV-TR (SCID) G1: 32 G2: 37 6 wk (2 wk) ≥ 18 yr., BMI ≥ 30, ≥ 3 binge days/wk in 2 wk screening period Mean age 45.2* Mean BMI: 39* Mean weight: 106.9 kg* % Female: 90* % Nonwhite: 19* *Based on ITT sample N:62	G1: ALKS-33: 10mg/day, if poorly tolerated, decreased to 5 mg/day G2: Placebo Co-interventions = none	Binge • Binge days/wk • Binges/wk • Abstinence Eating-related • YBOCS-BE total • TFEQ total, 3 subscales • FCI Psychological • BDI • CGI-S Weight • Weight • BMI • Waist circumference

Table 14. Characteristics of included trials of other medications compared with placebo (continued)

Author, Year Country Funding Source Setting Design Risk of Bias	Diagnosis (diagnostic method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
McElroy, 2007[91] USA Outpatient RCT Medium	DSM TR (SCID) G1: 20 G2: 20 10 wk. (1 wk.) 18-65 yr., > 3 binge-eating episodes and > 2 binge days in the week before receiving study medications, weight > 85% of the midpoint of ideal body weight for height Mean age: 41.2 Female: 82% Mean weight: 111.8 kg Mean BMI: 39.4 Lifetime depression: 48% Current depression: 15%	G1: Atomoxetine: 40 mg for 1 wk, titrated up to 120 mg/day as tolerated G2: Placebo	Binge • Binges/wk • Binge days/wk Eating-related • TFEQ total, 3 subscales • YBOCS-BE total, 2 subscales Psychological • HDRS • CGI-S Weight • Weight • BMI
Brownley, 2013[138] USA Outpatient RCT Medium	DSM IV (SCID) G1: 8 G2: 9 G3: 7 6 mo BMI 25 to 45, age 18 to 60 yr. Mean age: 36.6 Mean BMI: 34.2 % Female: 83 % Nonwhite: 12	G1: High dose chromium, 1000 µg/day as CrPic G2: Moderate dose chromium, 600 µg/day as CrPic G3: Placebo	Binge • Binges past 28 days Eating-related • EDE-Q global, 4 subscales Psychological • QIDS-SR Weight • Weight Other • Glucose

BMI = body mass index; CrPic = chromium picolinate; DSM = Diagnostic and Statistical Manual for Mental Disorders; EDE = Eating Disorder Examination; G = group; HAM-A = Hamilton Anxiety scale; HDL = high density lipoprotein; HDRS = Hamilton Depression Rating Scale (a.k.a. HAM-D); IBW = ideal body weight; IV = fourth edition; LDL = low density lipoprotein; mL = milliliter; µU/mL = microunits; RCT = randomized controlled trial; MADRS = Montgomery-Asberg Depression Rating Scale; mg = milligrams; mo = months; N=number; NR = not reported; RCT = randomized controlled trial; SD = standard deviation; SDS = Sheehan Disability Scale; TFEQ = Three-Factor Eating Questionnaire; TR = Text Revision; tx = treatment; USA = United States of America; WHR = waist-to-hip ratio; wk = week; YBOCS-BE = Yale-Brown Obsessions and Compulsions Scale modified for binge-eating

Acamprosate reduces cravings for alcohol and symptoms of anxiety associated with alcohol withdraw; it is approved for treating patients with alcohol dependence. ALKS-33 has shown some promise in treating patients with alcoholism, but it is better recognized for its antidepressant potential when combined with buprenorphine to produce ALKS 5461. Atomoxetine is used to treat attention-deficit hyperactivity disorder and to aid in weight loss. Chromium picolinate has insulin-sensitizing and serotonergic properties; thus, it affects blood glucose (especially in insulin-resistant individuals) and appetite and mood regulation.

Key Points

- The strength of evidence is insufficient to determine the efficacy of any of the other specific pharmacologic treatments (acamprosate, ALKS-33, atomoxetine, or chromium picolinate) because each was studied in a single, small sample trial.

Detailed Synthesis

Binge-Eating Outcomes

Two medications-- acamprosate[136] and atomoxetine[91]—were associated with a greater reduction in binge frequency than placebo. Only atomoxetine resulted in a higher percentage of participants achieving abstinence. Neither ALKS-33[137] nor chromium picolinate[138] was associated with a greater reduction in binge frequency or a greater percentage abstinent compared with placebo.

Eating-Related Psychopathology Outcomes

Compared with placebo, both acamprosate[136] and atomoxetine[91] were associated with greater reductions in binge-eating related obsessions and greater improvements in general mental health and global illness symptoms. High-dose chromium picolinate (1000 µg/day) was associated with a faster rate of reduction in eating, shape, and weight concerns; moderate-dose chromium picolinate (600 µg/day) was associated with a faster rate of reduction in weight concerns than placebo.[138]

Weight-Related Outcomes

Of the four interventions, only atomoxetine was associated with a greater reduction in weight and BMI than placebo.[91] However, in a sensitivity analysis excluding one noncompliant "outlier"- participant, both high and moderate-dose chromium picolinate were associated with a faster rate of weight reduction.[138]

General Psychological Outcomes

All four trials assessed treatment-related changes in symptoms of depression; however, each used a different instrument. None of the four interventions was associated with significantly greater reductions in depression symptoms compared with placebo. However, compared with placebo, acamprosate was associated with greater improvements in general mental health, as measured by the SF-12[136] and atomoxetine was associated with a greater reduction in global symptom severity, as indexed by the Clinical Global Impressions scale.[91]

Other Outcomes

Two placebo-controlled trials evaluated changes in blood levels of weight- and appetite-regulating hormones. Both high- and moderate-dose chromium picolinate produced a greater rate of reduction in blood glucose concentration.[138] Acamprosate was no more effective than placebo in reducing blood concentrations of glucose, insulin, or cholesterol.[136]

Table 15. Binge-eating disorder treatment results: Outcomes of included other pharmacological interventions compared with placebo

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy, 2011[136] **Acamprosate** (20/15) **Placebo** (20/9) 10 weeks ITT Mixed-model RMANOVA	Binge days/wk, mean (SD) Pre-tx: G1: 4.2 (1.7) G2: 3.8 (1.2) Post-tx: G1: 1.8 (2.2) G2: 2.6 (2.1) Mean (95% CI) diff b/t groups in change from baseline to post-tx, −1.14 (−2.22, −0.05) (p=0.04) Nonstatistically significant diff between groups in change over time: Binges/wk	YBOCS-BE Total, mean (SD) Pre-tx: G1:19.6 (2.9) G2: 19.9 (4.7) Post-tx: G1: 10.6 (7.1) G2: 15.4 (6.3) Mean (95% CI) diff b/t groups in change from baseline to post-tx, −4.5 (−8.23, −0.77) (p=0.02) YBOCS-BE Obsessions, mean (SD) Pre-tx: G1: 9.9 (1.9) G2: 10.0 (2.7) Post-tx: G1: 5.3 (3.6) G2: 7.9 (3.0) Mean (95% CI) diff b/t groups in change from baseline to post-tx, −2.53 (−4.63, −0.43) (p=0.02) FCI, mean (SD) Pre-tx: G1: 82.2 (16.7) G2: 79.4 (18.0) Post-tx: G1: 59.5 (15.6) G2: 69.7 (22.7) Mean (95% CI) diff b/t groups in change from baseline to post-tx, −12.93 (2.75, 23.12) (p=0.01) Nonstatistically sig diff between groups in change over time: YBOCS-BE compulsions TFEQ total and 3 subscales	Nonstatistically sig diff between groups in change over time: Weight BMI	SF-12 Mental health score, mean (SD) Pre-tx: G1: 48.7 (9.8) G2: 49.3 (9.2) Post-tx: G1: 53.1 (9.1) G2: 46.9 (11.0) Mean (95% CI) diff b/t groups in change from baseline to post-tx, 7.42 (2.91, 11.93) (p < 0.001) Nonstatistically significant diff between groups in change over time: MADRS SF-12 Physical health score

Table 15. Binge-eating disorder treatment results: Outcomes of included other pharmacological interventions compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy, 2013[137] **ALKS-33** (32/16) **Placebo** (37/33) 6 weeks ITT Mixed-model RMANOVA	Nonstatistically sig diff between groups in change over time: Binge episodes/wk Binge days/wk Abstinence	Nonstatistically sig diff between groups in change over time: YBOCS-BE and 3 subscales TFEQ and 3 subscales FCI	Nonstatistically sig diff between groups in change over time: Weight BMI WC	Nonstatistically sig diff between groups in change over time: BDI CGI severity
McElroy, 2007[91] **Atomoxetine** (20/14) **Placebo** (20/11) 10 weeks ITT Mixed-model RMANOVA	Binges/wk Mean diff (95% CI) in rate of change over time: -0.41 (−0.61, −0.09) G1 > G2 (p=0.018) Mean diff (95% CI) in change from baseline to 10 wks: −0.16 (−0.29, −0.01) G1 > G2 (p=0.034) Binge days/wk Mean diff (95% CI) in rate of change over time: -0.45 (-0.63, -0.18) G1 > G2 (p=0.003) Mean diff (95% CI) in change from baseline to 10 wks: -0.17 (-0.30, -0.03) G1 > G2 (p=0.023) % Abstinent G1: 70% G2: 32% (p=0.025)	YBOCS-BE Total Mean diff (95% CI) in rate of change over time: -4.77 (-9.25, -0.28) G1 > G2 (p=0.037) Mean diff (95% CI) in change from baseline to 10 wks: -5.30 (-9.01, -1.59) G1 > G2 (p=0.006) YBOCS-BE Obsessions Mean diff (95% CI) in rate of change over time: -3.04 (-5.41, -0.66) G1 > G2 (p=0.012) Mean diff (95% CI) in change from baseline to 10 wks: -3.50 (-5.73, -1.27) G1 > G2 (p=0.003) Nonstatistically significant difference in change over time: TFEQ Total and 3 subscales YBOCS-BE compulsions	Weight Mean diff (95% CI) in rate of change over time: -3.09 (-5.46, -0.72) G1 > G2 (p=0.010) Mean diff (95% CI) in change from baseline to 10 wks: -2.69 (-4.88, 0.49) G1 > G2 (p=0.018) BMI Mean diff (95% CI) in rate of change over time: -1.03 (-1.86, -0.20) G1 > G2 (p=0.016) Mean diff (95% CI) in change from baseline to 10 wks: -0.89 (-1.66, -0.12) (p=0.025)	CGI Severity Mean diff (95% CI) in rate of change over time: -1.12 (-2.01, -0.22) G1 > G2 (p=0.015) Mean diff (95% CI) in change from baseline to 10 wks: -1.20 (-1.90, -0.50) G1 > G2 (p=0.013) Nonstatistically sig diff in change over time: HAM-D

Table 15. Binge-eating disorder treatment results: Outcomes of included other pharmacological interventions compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
McElroy, 2007[91] (continued)			Nonstatistically sig diff in rate of change over time: Weight	
Brownley, 2013[138] G1:**1000 µg/day Chromium picolinate** (8/7) G2:**600 µg/day Chromium picolinate** (9/8) G3:**Placebo** (7/6) Mixed-model RMANOVA	Nonstatistically sig diff between groups rate of change over time: Binges past 28 days	EDE-Q Eating Concerns, monthly rate of change, mean (SD) G1: -0.29 (0.08) G2: -0.11 (0.08) G3: -0.02 (0.08) Mean diff in rate of change over time: G1 > G3, t=-2.23,(p=0.04) EDE-Q Shape Concerns, monthly rate of change, mean (SD) G1: -0.24 (0.08) G2: -0.16 (0.07) G3: -0.01 (0.08) Mean diff in rate of change over time: G1 > G3, t=-2.08, (p=0.04) EDE-Q Weight Concerns, monthly rate of change, mean (SD) G1: -0.20 (0.07) G2: -0.18 (0.06) G3: 0.06 (0.07) Mean diff in rate of change over time: G1 > G3, t=-2.23 (p=0.04) G2 > G3, t=-2.48 (p=0.02) Nonstatistically sig diff between groups in rate of change over time:	Weight, kg, monthly rate of change, mean (SD) G1: -0.23 (0.21)[a] G2: -0.13 (0.18) G3: 0.55 (0.25) Mean diff in rate of change over time: G1 > G3, t=-2.72 (p<0.02) G2 > G3, t=-2.59 (p<0.02)	Glucose, mg/dL, monthly rate of change, mean (SD) G1: -1.08 (0.80) G2: -0.67 (0.74) G3: 2.53 (0.80) Mean diff in rate of change over time: G1 > G3, t=-3.19 (p<0.01) G2 > G3, t=-2.39 (p<0.01) Nonstatistically significant diff between groups in rate of change over time: QIDS-SR_{16}

Table 15. Binge-eating disorder treatment results: Outcomes of included other pharmacological interventions compared with placebo (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
		EDE-Q Global EDE-Q Eating Concerns, G2 vs. G3 EDE-Q Shape Concerns, G2 vs. G3 EDE-Q Restraint		

[a] Sensitivity analysis performed after excluding 1 subject from G1 who was noncompliant with study medication and deemed to b a statistical outlier for binge frequency and weight.

BMI = body mass index; CrPic = chromium picolinate; diff = difference; dL = deciliter; DSM = Diagnostic and Statistical Manual for Mental Disorders; EDE=Q = Eating Disorder Examination Questionnaire; FCI = Food craving inventory; HAM-A = Hamilton Anxiety scale; HDL = high density lipoprotein; HDRS = Hamilton Depression Rating Scale (a.k.a. HAM-D); IV = fourth edition; LDL = low density lipoprotein; mL = milliliter; µU/mL = microunits; RCT = randomized controlled trial; MADRS = Montgomery-Åsberg Depression Rating Scale; mg = milligrams; N=number; QID-SR16 = Quick Inventory of Depressive Symptomatology (self-report; 16 items)RCT = randomized controlled trial; SD = standard deviation; SDS = Sheehan Disability Scale; TFEQ = Three-Factor Eating Questionnaire; TR = Text Revision; tx = treatment; USA = United States of America; WC = waist circumference; WHR = waist-to-hip ratio; wk = week; YBOCS-BE = Yale-Brown Obsessions and Compulsions Scale modified for binge-eating

Behavioral Interventions: Cognitive Behavioral Therapy versus No or Limited Intervention

Description of Interventions and No or Limited Intervention

The interventions discussed in this section are limited to various types of CBT. This form of psychotherapy focuses on identifying relations among thoughts, feelings, and behaviors and aims to change negative thoughts about oneself and the world and, by doing so, reduce negative emotions and undesirable behavior patterns. CBT can be delivered in various formats; common approaches include therapist-led (TL), partially therapist-led (PTL), and three self-help strategies

The two therapist-led approaches can involve either individual sessions (one-on-one) or group sessions (with group sizes varying but typically with fewer than 10 in a group). The therapist-led CBT format generally has a therapist present for the duration of each session to provide psychoeducation, teach new skills, and give support to participants. In the less intensive partially therapist-led CBT format, participants typically first watch a psycho-educational videotape (tailored for each session) and then are joined by the therapist for the second half of each session.

Self-help interventions typically involve providing participants with a self-contained treatment manual; it usually walks the individual through each "session" of CBT that a therapist would typically present. The most widely used CBT self-help manual is Fairburn's *Overcoming*

Binge Eating;[139] other manuals are available, however. Self-help can be further differentiated into three main categories: structured, guided, and pure. In structured self-help, participants meet in groups and watch a psycho-educational videotape tailored for each session for one-half of a session; for the second half, a group member leads or facilitates discussion. In guided self-help, participants typically have brief meetings with a facilitator or guide to supplement the self-help approach; the facilitator or guide can be available in person or via the Internet. Finally, the pure self-help approach means that participants have access only to the self-help manual for the duration of their treatment.

Comparators for the CBT trials entailed no or only limited interventions: waitlist control, an "active control" condition, or usual care. Waitlist is the most common comparator. Participants assigned to waitlist control are assessed at baseline (along with participants assigned to CBT) and at various followup time points (typically after treatment), but they do not receive any active intervention. Participants assigned to an active control group complete self-monitoring records and meet regularly with a therapist who reinforces the necessity of the monitoring but does not intervene otherwise; any motivational, behavioral, or cognitive advice is proscribed.

The usual care condition is unique relative to both waitlist and active control. Participants assigned to usual care are instructed to follow the advice and treatment recommendations of their primary care physicians; this can include one or more of a broad range of interventions (which may not be BED-specific) but not any specific intervention. That is, usual care approximates the routine care that patients might receive if researchers were not involved in the trial. Usual care differs from both (a) treatment as usual (in which participants receive a particular treatment) and (b) standard of care (in which participants receive evidence-based care for a specific diagnosis). Thus, patients receive one or more of a broad range of interventions that their primary care physician might prescribe, but they do not receive any specific intervention for BED.

Description of Studies

Nine trials in all compared CBT with limited or no intervention.[65,66,68,71,74,140-143] All nine trials recruited participants who met DSM-IV criteria for BED; one trial also recruited participants who met the frequency criterion for DSM-5, but the investigators did not report data separately for this group.[143] Within these nine trials were a total of 14 comparisons: 12 with waitlist control, one with an active control, and one involving usual care. In some cases, a trial discussed in this section compared CBT with some other related intervention (such as behavioral weight loss therapy), but these analyses are reported later.

All nine trials included adults from 18 to 65 years of age. Mean BMI for all participants across studies was in either the overweight[74] or the obese range.[65,66,68,71,140-143] Four trials required participants to have a BMI in the overweight or obese range.[65,68,142,143] For two trials, we could determine that an unspecified number of participants were in the normal weight range at baseline.[71,74] A total of 751 individuals were randomized to treatment; about 10 percent of the participants were male. Of the trials reporting on race, more than 95 percent were white, with two exceptions: the Grilo trials recruited 23 percent and 54 percent of participants from a racial or ethnic minority.[68,143]

Finally, all trials reported binge eating, eating-related psychopathology, weight, and general psychological outcomes. One trial did not report weight outcomes separately by treatment arm.[144] In addition, one trial evaluated the impact of therapist-led CBT versus waitlist on interpersonal problems.[140] Another examined the effect of rapid response on treatment outcomes in patients assigned to guided self-help CBT or an active control group.[68]

Cognitive Behavioral Therapy Versus Waitlist

Of the 12 comparisons (in seven separate trials) involving CBT and waitlist controls, (Table 16) five involved therapist-led CBT,[65,66,140-142] two involved partially therapist-led CBT,[65,66] two used structured self-help CBT,[65,66] two used guided self-help CBT including one Internet-based guide,[74] and one in vivo guide,[71] and one used pure self-help CBT.[71] Two waitlist trials delivered CBT in an individual format[71,74] and five delivered CBT in a group format.[65,66,140-142] No trial examined differences between individual and group formats.

Table 16. Characteristics of trials comparing cognitive behavioral therapy with waitlist for binge-eating disorder

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Carrard et al., 2011[74] Switzerland Internet-based RCT Medium	DSM-IV (EDO) G1: 37 G2: 37 6mo (6mo) Females only Subthreshold = DSM-5 BED 18-60 years old Fluent in French Average Internet skills Mean age: 36.0 Mean BMI: 28.8 Other psychological condition: 27.7%	G1: **CBTgsh** (Internet-guided): 11, sequential CBT modules + weekly email contact with a coach; individual format G2: **Waitlist control** Co-interventions: None	Binge • Binge episodes (EDEQ) • Abstinence Eating-related • EDI-2 • EDEQ, 4 subscales • TFEQ, 3 subscales Weight • BMI Psychological • BDI • SCL-90R (GSI subscale) • RSE Quality of life • IWQOL-Lite
Carter and Fairburn, 1998[71a] United Kingdom Outpatient RCT Medium	DSM IV (EDE) G1: 24 G2: 24 G3: 24 12 wks (6 mo) Female Mean age: 39.7 Non-white: 3% Mean BMI: 31.6	G1: **CBTpsh**: Participants were asked to read Overcoming Binge Eating and follow its self-help program for 12 weeks; individual format G2: **CBTgsh**: Nonspecialist therapists led between 6 and 8 25-minute sessions to support participants in using Overcoming Binge Eating book; individual format G3: **Waitlist control** Co-interventions: None	Binge • Binge-eating frequency past 28 days (EDE) • Abstinence Eating-related • EDE, global, 4 scores Psychological • BSI, 1 scale • RSE Weight • BMI

Table 16. Characteristics of trials comparing cognitive behavioral therapy with waitlist for binge-eating disorder (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Dingemans et al., 2007[141] Netherlands Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G1: 30 G2: 22 20 wks (1 yr) Mean age: 37.8 Female: 94% Mean BMI: 38.9 Current mood disorder: 16% Current anxiety: 17%	G1: **CBT-TL**: 15, 2 hour group sessions conducted over a 20-week period; first 10 sessions were weekly and last 5 were biweekly. Homework assignments and feedback on food diaries were part of all sessions G2: **Waitlist control** until end of G1 treatment (20 weeks) when participants were offered CBT Co-interventions: None	Binge • SBE in past 28 days (EDE) • OOEs in past 28 days (EDE) • Abstinence from OBE (EDE) Eating-Related • EDE, global, 4 scores Psychological • BDI • SCL-90 (Global severity) • Utrecht Coping List, 7 scores Weight • BMI
Eldredge et al., 1997[142] NR Outpatient RCT Medium	DSM-IV (NR) G1: 36 G2: 10 12 wks Adults BMI ≥ 27 Mean age: 45.2 Mean BMI: 38.4 Female: 96%	G1: **CBT-TL**: manualized, group therapist-led CBT, 12, 90-min weekly sessions G2: **Waitlist control** Co-interventions: None	Binge • Binge days/week (Diary) Eating-related • TFEQ, 3 subscales • BES Weight • BMI Psychological • BDI • IIP • RSE • SCL-90

Table 16. Characteristics of trials comparing cognitive behavioral therapy with waitlist for binge-eating disorder (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Peterson et al., 1998[66] United States Outpatient RCT Medium	DSM IV (Structured clinical interview) G1: 16 G2: 19 G3: 15 G4: 11 8 wks Adult females Mean age: 42.4 Non-white; 4% Mean BMI: 34.7	G1: **CBT-TL:** 14, 60-minute group sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half psychoeducational; 2nd half therapist led group discussion G2: **CBT-PTL:** 14, 60-minute group sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half viewed videotape of same psychologist in therapist-led psychoeducational condition; 2nd half therapist led group discussion G3: **CBTssh:** 14, 60-minute group sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half viewed videotape of same psychologist in therapist-led psychoeducational condition; 2nd half one group member assigned to facilitate group discussion G4: **Waitlist control** Co-interventions: None	Binge: • OBE per week (EB IV) • Total episodes – OBE and SBE per week • Hours binge eating per week Eating-related • BES • TFEQ, 3 scales • BSQ Psychological • HDRS • RSE Weight • BMI

Table 16. Characteristics of trials comparing cognitive behavioral therapy with waitlist for binge-eating disorder (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Peterson et al., 2009[65] United States Outpatient RCT Medium	DSM IV G1: 60 G2: 63 G3: 67 G4: 69 20 wks (6 mo, 12 mo) BMI ≥ 25 Mean age = 47.1 Females = 88% Non-white = 4% Mean BMI = 39 Anti-depressant medication = 79%	G1: **CBT-TL**: 15 group sessions, weekly for 1st 10 weeks, then bi-weekly. Therapist provided psychoeducation. G2: **CBT-PTL:** 15 group sessions, weekly for 1st 10 weeks, then bi-weekly. Sessions consisted of watching psychoeducational video during first half and psychotherapist led homework review and discussion during second half. G3: **CBTssh**: 15 group sessions, weekly for 1st 10 weeks, then bi-weekly. Sessions consisted of watching psychoeducational video and homework review and discussion led my members on rotating basis. G4: **Waitlist control**: group received therapist-led group CBT at end of 20-week waiting period Co-Interventions: Anti-depressant medication	Binge • Frequency of OBE episodes (EDE) • OBE in past 28 days • Abstinence from OBEs in past 28 days Eating-related • EDE, global, 4 scores • TFQ, 3 scores Psychological • IDS-SR – Depression Weight • BMI

Table 16. Characteristics of trials comparing cognitive behavioral therapy with waitlist for binge-eating disorder (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Tasca et al., 2006[140a] Tasca et al., 2012[145b] Canada Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G1: 48 (not included in this comparison) G2: 47 G3: 40 16 wks (6 mo) ≥ 18 years old Mean Age: 42.8 Mean BMI: 41.1 Female: 91% Non-white: 2% Current mood disorder: 62%	G1: **PIPT-TL**: 16 manualized, 90-minute, weekly group based psychodynamic interpersonal therapy sessions G2: **CBT-TL**: 16 manualized, 90-minute, weekly group CBT therapy sessions G3: **Waitlist control** Co-interventions: None	Binge (EDE) • Days binged Weight • BMI Eating Related • TFEQ, 2 scales Psychological • CES-D total • IIP total • RSE total

[a] These trials included other treatment arms that will be discussed in subsequent sections of this chapter.

[b] Examined IIP scores in G1 and G2 only

BDI = Beck Depression Inventory; BED = binge-eating disorder; BES = Binge Eating Scale; BMI = body mass index; BSI = Brief Symptom Inventory; BSQ = body shape questionnaire; CBT = cognitive behavioral therapy; CBTgsh = cognitive behavioral therapy, guided self-help; CBT-PTL = cognitive behavioral therapy, partially therapist-led; CBTpsh = cognitive behavioral therapy, pure self-help; CBTssh = cognitive behavioral therapy, structured self-help; CBT-TL = cognitive behavioral therapy, therapist led; CESD = Center for Epidemiologic Studies Depression Scale; DSM = Diagnostic and Statistical Manual, Fourth Edition; EB-IV = Eating Behaviors, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; EDI-2 = Eating Disorder Inventory, Second Edition; EDO = Eating Disorders in Obesity; HDRS = Hamilton Depression Rating Scale; G = group; GSI = Global Severity Index; IDS-SR = Inventory of Depressive Symptoms – Self-Report; IIP = Inventory of Interpersonal Problems; IWQOL = Impact of Weight on Quality of Life; RCT = randomized controlled trial; min = minute(s); mo = months; NR = not reported; OBE = objective binge episodes; OOE = objective overeating episode; PIPT-TL = psychodynamic interpersonal therapy, therapist-led; RSE = Rosenberg Self-Esteem; SCID/IP = Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Version; SCL-90 = Symptom Checklist 90; SBE = subjective binge episodes; TFEQ = Three Factor Eating Questionnaire; wks = weeks; yr = year

Cognitive Behavioral Therapy Versus Active Control or Usual Care

One trial (reported in two articles[68,146] compared CBT with an active control (clinical sessions for individual patients, emphasizing self-monitoring). Another trial compared CBT with usual care (as described earlier)[143] (Table 17). These trials applied either guided self-help or pure self-help CBT as the intervention.

Table 17. Characteristics of trials of cognitive behavioral therapy versus active control for binge-eating disorder

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Grilo et al., 2005[68a] United States Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G1: 37 G3: 15 8 wks (4 wks) 18-60 years old BMI ≥ 27 Mean age: 46.3 Mean BMI: 35.5 Female: 79% Any Axis I psychiatric disorder: 68.91%	G1: Guided self-help CBT self-help manual[139] + 6, 15-20min, bi-weekly, individual clinician sessions over 12 weeks G3: **Active Control**: 6, 15-20 min, bi-weekly, individual clinician sessions over 12 weeks; focused on completion of self-monitoring Co-interventions: None	Binge • Binge episodes/mo (Diary, EDEQ) • Abstinence (Diary, EDEQ) Eating-related • EDEQ, 4 subscales • TFEQ-Hunger • TFEQ-Restraint • TFEQ-Disinhibition Weight • BMI Psychological • BDI • RSE
Grilo et al., 2013[143] United States Outpatient RCT Low	DSM-IV or DSM-V G1: 24 G2: 24 16 weeks BMI ≥30 Mean age: 45.8 Female: 79.2% Non-white: 54.2% Mean BMI: 37.6	G1: Pure self-help **CBT+ Usual care** PCPs gave participants self-help manual *Overcoming Binge Eating*"[139] and participants received usual care G2: **Usual care**: participants instructed to follow whatever advice and treatment their PCPs recommended, although patients asked to refrain from seeking commercial self-help programs. All patients had existing relationships with primary care settings Co-interventions: None	Binge • No OBEs during previous 28 days • Frequency of OBEs in previous 28 days evaluated using EDE-Q • Frequency of OBEs in previous 28 days evaluated using EDE Eating-related • EDE-Q Global • EDE-Global Psychological • BDI Weight BMI

BDI = Beck Depression Inventory; BMI = body mass index; BSI = Brief Symptom Inventory; BWLgsh = behavioral weight loss, guided self-help; CBT = cognitive behavioral therapy; CBTgsh = cognitive behavioral therapy, guided self-help; DSM = Diagnostic and Statistical Manual, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; G = group; LEARN = Lifestyle, Exercise, Attitude, Relationships, Nutrition; RCT = randomized controlled trial; min = minute(s); mo = months; RSE = Rosenberg Self-Esteem; SCID/IP = Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Version; TFEQ = Three Factor Eating Questionnaire; wks = weeks

Key Points: Waitlist Comparisons

Table 18 documents the findings and provides the strength of evidence from these nine CBT trials with waitlist as the control group. The four categories of outcomes are binge-eating outcomes, eating-related psychopathology, weight outcomes, and psychological outcomes**.**

- Generally, across treatment formats, CBT was more effective in improving binge-eating outcomes measured at the end of treatment.

  - CBT (therapist-led) was superior to waitlist in reducing binge frequency (high strength of evidence for benefit) and in percentage of participants abstinent (high strength of evidence for benefit).
  - CBT (partially therapist-led) was superior to waitlist in reducing binge frequency (low strength of evidence for benefit) and percentage of participants abstinent (low strength of evidence for benefit).
  - CBT (structured self-help) was superior to waitlist in reducing binge frequency (low strength of evidence for benefit). Abstinence results were mixed (insufficient strength of evidence).

- Therapist-led CBT was superior to waitlist in reducing eating-related psychopathology as measured by two scales, EDE and TFEQ (high strength of evidence for benefit).
- Across treatment formats, CBT was not superior to waitlist in weight outcomes at the end of treatment.
  - BMI reduction was not greater among therapist-led CBT participants (moderate strength of evidence for no difference).
  - BMI reduction was not greater among partially therapist-led CBT participants (low strength of evidence for no difference).
  - BMI reduction was not greater among structured self-help CBT participants (low strength of evidence for no difference).
- Across treatment formats, CBT was not superior to waitlist in psychological outcomes at the end of treatment.
  - Reductions in depression were not greater among therapist-led CBT participants (moderate strength of evidence for no difference).
  - Reductions in depression were not greater among partially therapist-led CBT participants (low strength of evidence of no difference).
  - Reductions in depression were not greater among structured self-help CBT participants (low strength of evidence of no difference).
- Five small RCTs examined the efficacy of guided or pure self-help CBT but differed in delivery format or comparator (evidence was insufficient for all comparisons and outcomes).

Table 18. Strength of evidence for outcomes of interventions for binge-eating disorder: Cognitive behavioral therapy versus waitlist controls

Treatment Comparison	Binge Eating	Eating-Related Psychopathology	Weight	Psychological Outcomes
Therapist-led CBT vs. waitlist, post-treatment	**High** 5 RCTs (N=344) CBT better Binge frequency **High** 4 RCTs (N=298) CBT better Abstinence	**High** 5 RCTs (N=344) CBT better EDE and TFEQ scales	**Moderate** 5 RCTs (N=344) No difference in BMI	**Moderate** 5 RCTs (N=344) No difference in depression
Partially therapist-led CBT vs. waitlist, post-treatment	**Low** 2 RCTs (N=162) CBT better Binge frequency **Low** 2 RCTs (N=162) CBT better Abstinence	**Insufficient** 2 RCTs (N=162) Mixed results	**Low** 2 RCTs (N=162) No difference in BMI	**Low** 2 RCTs (N=162) No difference in depression
Pure CBT vs. waitlist, post-treatment	**Insufficient** 1 RCT (N=NR) CBT better	**Insufficient** 1 RCT (N=NR) CBT better	**Insufficient** 1 RCT (N=NR) No difference	**Insufficient** 1 RCT (N=NR) CBT better
Structured self-help CBT vs. waitlist	**Low** 2 RCTs (N=162) CBT better Binge frequency **Insufficient** 2 RCTs (N=162) Mixed results Abstinence	**Insufficient** 2 RCTs (N=162) Mixed results	**Low** 2 RCTs (N=162) No difference in BMI	**Low** 2 RCTs (N=162) No difference in depression

[a] Unless otherwise noted, reflects binge frequency and abstinence outcomes; [b] Unless otherwise noted, reflects weight and BMI outcomes

BMI = body mass index; CBT-PTL = cognitive behavioral therapy, partially therapist-led; CBTpsh = cognitive behavioral therapy, pure self-help; CBTssh = cognitive behavioral therapy, structured self-help; CBT-TL = cognitive behavioral therapy, therapist led; EDE = Eating Disorder Examination; N = sample size; RCT = randomized controlled trial; TFEQ = Three Factor Eating Questionnaire; vs = versus

Key Points: Active Control or Usual Care Comparisons

Table 19 summarizes findings for these trials and provides the strength of evidence grades for the four main categories of outcomes.

Table 19. Strength of evidence for outcomes of interventions for binge-eating disorder: Cognitive behavioral therapy versus active control or usual care

Treatment Comparison	Binge Eating	Eating-related psychopathology	Weight	Psychological Outcomes
Guided self-help CBT vs. active control	**Insufficient** 1 RCT (N=52) CBT better	**Insufficient** 1 RCT (N=52) CBT better	**Insufficient** 1 RCT (N=52) No difference	**Insufficient** 1 RCT (N=52) No difference
Pure self-help CBT vs. usual care	**Insufficient** 1 RCT (N=48) CBT better Binge frequency (EDEQ only) **Insufficient** 1 RCT (N=48) No difference Abstinence	**Insufficient** 1 RCT (N=48) No difference	**Insufficient** 1 RCT (N=48) No difference	**Insufficient** 1 RCT (N=48) No difference

CBT = cognitive behavioral therapy; EDEQ = Eating Disorder Examination Questionnaire; N = number; RCT = randomized controlled trials; vs. = versus

- Binge-eating episodes were significantly lower with CBT interventions than with the limited interventions in two trials that differed somewhat in the treatment and comparator groups (insufficient evidence).
- Abstinence was significantly better with CBT versus active control but not versus usual care (one trial each; insufficient evidence).
- Reductions in BMI and depression were not greater among guided self-help CBT or pure self-help participants (insufficient evidence for no difference).

Detailed Synthesis

Nine trials compared CBT in various forms with waitlist, active control, or usual care. CBT format differed across trials and some trials included more than one CBT format. Five measured therapist-led CBT, two partial therapist-led CBT, and six measured CBT in various self-help formats. Seven trials compared treatment outcomes to waitlist, one to active control, and one to usual care. They differed in length of treatment (8 to 24 weeks); followup after the end of treatment ranged from none to 1 year. All nine trials reported on binge-eating outcomes, eating-related psychopathology, weight, and general psychopathology outcomes.

In what follows, Table 20 reports findings on the four categories of outcomes only for the trials employing a waitlist comparison. Table 21 documents the findings the trials using either active control or usual care.

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Carrard et al., 2011[74] G1: **CBTgsh (Internet-led)** (37/14/28) G2: **Waitlist** (37/11/30) ITT analysis Linear mixed model with random intercept	Binge episodes/mo, mean (SD) Pre-tx: G1: 17.4 (15.6) G2: 14.8 (9.6) Post-tx: G1: 8.9 (5.9) G2: 11.0 (4.9) Diff at post-tx: (p=0.031) Abstinence, % (N) Pre-tx: NR Post-tx: G1: 35.1% (N=13) G2: 8.1% (N=3) Diff at post-tx: (p = 0.005)	EDI-Drive for thinness, mean (SD) Pre-tx: G1: 11.5 (4.9) G2: 11.6 (5.2) Post-tx: G1: 8.9 (5.9) G2: 11.0 (4.9) 6mo: G1: 5.4 (4.7) G2: 7.8 (6.0) Diff at post-tx: (p=0.020) EDI-Bulimia, mean (SD) Pre-tx: G1: 6.3 (3.4) G2: 6.5 (4.1) Post-tx: G1: 2.8 (2.6) G2: 5.9 (4.4) Diff at post-tx: (p<0.001) EDI-Body dissatisfaction, mean (SD) Pre-tx: G1: 22.3 (5.2) G2: 19.0 (6.7) Post-tx: G1: 19.0 (7.0) G2: 18.9 (6.8) 6mo: G1: 15.6 (7.7) G2: 14.5 (9.2) Diff at post-tx: (p = 0.001) EDI-Interoceptive awareness, mean (SD) Pre-tx: G1: 7.0 (5.3) G2: 7.4 (5.5) Post-tx: G1: 4.5 (4.5) G2: 7.3 (6.2) Diff at post-tx: (p=0.024)	BMI, mean (SD) Pre-tx: G1: 29.8 (5.9) G2: 27.7 (5.5) Post-tx: G1: 29.2 (6.0) G2: 27.9 (5.4) Diff at post-tx: (p=0.002)	RSE, mean (SD) Pre-tx: G1: 17.5 (5.2) G2: 18.1 (5.9) Post-tx: G1: 21.3 (4.2) G2: 19.1 (4.9) Diff at post-tx: (p=0.015) IWQOL-Lite, mean (SD) Pre-tx: G1: 66.9 (15.3) G2: 71.6 (16.3) Post-tx: G1: 71.7 (16.7) G2: 71.8 (18.0) 6mo: G1: 78.2 (14.8) G2: 76.0 (20.2) Diff at post-tx: (p=0.041) Nonstatistically sig diff at post-tx: BDI SCL-90R GSI

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N	Binge-Eating Outcomes	Eating-Related Psychopathology	Weight Outcomes	Psychological and Other Outcomes

Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Outcomes
Carrard et al., 2011[74] (continued)	EDEQ-Shape concern, mean (SD) Pre-tx: G1: 4.7 (0.9) G2: 4.3 (1.1) Post-tx: G1: 3.7 (1.3) G2: 4.1 (1.3) 6mo: G1: 2.9 (1.5) G2: 3.3 (1.9) Diff at post-tx: (p=0.001) EDEQ-Total score, mean (SD) Pre-tx: G1: 3.6 (0.8) G2: 3.3 (1.0) Post-tx: G1: 2.5 (1.1) G2: 3.3 (1.9) Diff at post-tx: (p<0.001) TFEQ-Hunger, mean (SD) Pre-tx: G1: 8.7 (3.7) G2: 8.9 (3.2) Post-tx: G1: 6.7 (2.9) G2: 9.3 (2.8) 6mo: G1: 5.1 (3.4) G2: 6.7 (3.5) Diff at post-tx: (p=0.001) Nonstatistically sig diff at post-tx: EDI: Ineffectiveness, Perfectionism, Interpersonal Distrust, Maturity Fears, Impulse Regulation, Social Insecurity EDEQ-Restraint TFEQ-Restraint

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Carter et al., 1998[71] G1: **CBTpsh** (NR) G2: **CBTgsh** (NR) G3: **Waitlist** (NR) Total N = 72 ITT sample Repeated measures ANOVA (G1, G2, G3; pre- v post-tx) Repeated measures ANOVA (G1 v G2; pre- v post-tx v 3mo v 6mo)	Binge episodes/mo, mean (SD) Pre-tx: G1: 19.7 (12.9) G2: 17.8 (10.6) G3: 21.6 (12.5) Post-tx: G1: 9.3 (11.7) G2: 4.3 (7.8) G3: 13.5 (10.3) Diff in change over time (post-tx): (G1 v G3; p=0.001) (G2 v G3; p<0.05) Abstinence, % Pre-tx: NR Post-tx: G1: 43% G2: 50% G3: 8% Diff at post-tx: (G1 v G3; p=0.008) (G2 v G3; p=0.001)	Global score EDE, mean (SD) Pre-tx: G1: 3.7 (0.8) G2: 3.6 (1.0) G3: 3.6 (0.8) Post-tx: G1: 2.7 (1.3) G2: 2.1 (1.2) G3: 3.5 (0.8) Diff in change over time (post-tx): (G1 v G3: p=0.001) (G2 v G3: p=0.03) Restraint, mean (SD) Pre-tx: G1: 2.4 (1.5) G2: 2.5 (1.4) G3: 2.4 (1.4) Post-tx: G1: 2.1 (1.4) G2: 1.2 (1.3) G3: 2.6 (1.4) Diff in change over time (post-tx): (G1 v G2; p=0.006) (G2 v G3: p=0.002) Diff in change over time (3mo): (G1 v G2; p=0.01)	Nonstatistically sig diff at post-tx: BMI	GSI, mean (SD) Pre-tx: G1: 1.3 (0.8) G2: 0.9 (0.6) G3: 1.2 (0.8) Post-tx: G1: 0.8 (0.6) G2: 0.7 (0.6) G3: 1.2 (0.7) Diff in change over time (post-tx): (G1 v G3: p=0.003) (G2 v G3: p=0.04)

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Dingemans et al., 2007[141] G1: **CBT-TL** (30/28) G2: **Waitlist** (22/22) ITT sample Multilevel analysis	Abstinence, % Pre-tx: NR Post-tx: G1: 63% G2: 18% Diff at post-tx: (p<0.001) Nonstatistically sig diff in change over time: Binge episodes/mo	Weight concern, mean (SD) Pre-tx: G1: 3.4 (1.4) G2: 3.1 (1.3) Post-tx: G1: 1.9 (1.4) G2: 3.2 (1.2) Diff in change over time: (p<0.001) Shape concern, mean (SD) Pre-tx: G1: 2.5 (1.0) G2: 2.8 (1.0) Post-tx: G1: 1.6 (1.0) G2: 2.6 (1.2) Diff in change over time: (p<0.01) Eating concern, mean (SD) Pre-tx: G1: 2.0 (1.2) G2: 1.8 (1.2) Post-tx: G1: 0.9 (1.1) G2: 1.6 (1.1) Diff in change over time: (p<0.001) Restraint, mean (SD) Pre-tx: G1: 1.7 (1.1) G2: 1.7 (1.2) Post-tx: G1: 0.9 (1.0) G2: 1.9 (1.3) Diff in change over time: (p<0.01)	NR	SCL-90, mean (SD) Pre-tx: G1: 169.3 (48.0) G2: 167.2 (45.6) Post-tx: G1: 143.6 (49.0) G2: 170.0 (57.5) Diff in change over time: (p<0.001) BDI, mean (SD) Pre-tx: G1: 20.7 (13.1) G2: 17.7 (9.8) Post-tx: G1: 12.9 (13.2) G2: 17.4 (10.5) Diff in change over time: (p<0.01) UCL-Passive reacting, mean (SD) Pre-tx: G1: 14.0 (3.5) G2: 13.5 (2.7) Post-tx: G1: 12.0 (3.6) G2: 13.6 (3.4) Diff in change over time: (p<0.01) Nonstatistically sig diff in change over time: UCL: Active tackling, Palliative reacting, Avoiding, waiting, Seeking social support, Expression of emotions, Reassuring thoughts

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Dingemans et al., 2007[141] (continued)		Global score, mean (SD) Pre-tx: G1: 2.4 (0.9) G2: 2.3 (0.8) Post-tx: G1: 1.3 (1.0) G2: 2.3 (0.9) Diff in change over time: (p<0.001) Nonstatistically sig diff in change over time: Objective overeating/mo		
Eldredge et al., 1997[142] G1: **CBT-TL** (36/NR) G2: **Waitlist** (10/NR) Not reported Repeated measures ANOVA	Binge days/2wks, mean (SD) Pre-tx: NR Post-tx: NR Diff in change over time: (p=0.046)	Nonstatistically sig diff in change over time: BES TFEQ-Restraint TFEQ-Disinhibition TFEQ-Hunger	Nonstatistically sig diff in change over time: BMI	Nonstatistically sig diff in change over time: IIP BDI RSE GSI
Peterson et al., 1998[66] G1: **CBT-TL** (16/14) G2: **CBT-PTL** (19/17) G3: **CBTssh** (15/11) G4: **Waitlist** (11/9) ITT sample Random regression ANCOVA	Total binges, mean (SD) Pre-tx: G1: 7.7 (3.8) G2: 8.2 (5.9) G3: 6.8 (2.4) G4: 5.7 (6.0) Post-tx: G1: 3.3 (3.6) G2: 2.7 (4.3) G3: 1.8 (2.9) G4: 6.6 (4.5) Diff in change over time: G1, G2, G3 v G4: (p=0.002) OBEs, mean (SD) Pre-tx: G1: 3.4 (1.7) G2: 5.5 (6.5) G3: 3.1 (2.1) G4: 3.5 (4.9)	BES, mean (SD) Pre-tx: NR Post-tx: NR Diff in change over time: G1, G2, G3 v G4: (p = 0.024) TFEQ-Hunger, mean (SD) Pre-tx: NR Post-tx: NR Diff in change over time: G1, G2, G3 v G4: (p=0.003) TFEQ-Disinhibition, mean (SD) Pre-tx: NR Post-tx: NR Diff in change over time: G1, G2, G3 v G4: (p=0.010)	Nonstatistically sig diff in change over time: BMI	Nonstatistically sig diff in change over time: HDRS RSE BSQ

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Peterson et al., 1998[66] (continued)	Post-tx: G1: 0.7 (1.3) G2: 1.3 (3.4) G3: 0.4 (1.1) G4: 4.7 (4.7) Diff in change over time: G1, G2, G3 v G4: (p=0.000) Hours binged, mean (SD) Pre-tx: G1: 9.0 (6.7) G2: 13.4 (13.0) G3: 9.8 (5.5) G4: 8.3 (7.6) Post-tx: G1: 4.2 (6.9) G2: 3.2 (5.9) G3: 2.3 (3.3) G4: 9.6 (6.5) Diff in change over time: G1, G2, G3 v G4: (p=0.005) Total binge abstinence, % Pre-tx: NR Post-tx: G1: 18.8% G2: 36.8% G3: 53.5% G4: 0% Diff at post-tx: G1, G2, G3 v G4: (p=0.04) OBE abstinence, % Pre-tx: NR Post-tx: G1: 68.8% G2: 68.4% G3: 86.7% G4: 12.5% Diff at post-tx: G1, G2, G3 v G4: (p=0.004)	Nonstatistically sig diff in change over time: TFEQ-Restraint		

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Peterson et al., 1998[66] (continued)	Hours binged abstinence, % Pre-tx: NR Post-tx: NR Diff at post-tx: (p=0.04)			
Peterson et al., 2009[65] G1: **CBT-TL** (60/53/40/25) G2: **CBT-PTL** (63/43/38/30) G3: **CBTssh** (67/40/39/36) G4: **Waitlist** (69/56)	Binge episodes/mo, mean (SD) Pre-tx: G1: 24.6 (18.7) G2: 21.9 (12.3) G3: 22.4 (13.7) G4: 23.1 (14.1) Post-tx: G1: 6.3 (12.3) G2: 9.7 (12.4) G3: 11.9 (13.2) G4: 17.6 (14.6) Diff in change over time (post-tx): (p<0.001) G1 v. G3, G4: (p<0.008) G2 v. G4: (p<0.008) G3 v. G4: (p<0.008) Binge days/mo, mean (SD) Pre-tx: G1: 16.0 (6.9) G2: 16.4 (6.5) G3: 16.4 (6.8) G4: 17.1 (7.1) Post-tx: G1: 4.4 (7.3) G2: 7.6 (8.4) G3: 9.6 (8.6) G4: 13.5 (9.3) Diff in change over time (post-tx): (p<0.001) G1 v G3, G4: (p<0.008) G2 v G4: (p<0.008)	EDE-Restraint, mean (SD) Pre-tx: G1: 1.6 (1.3) G2: 1.3 (1.1) G3: 1.8 (1.5) G4: 1.5 (1.2) Post-tx: G1: 1.1 (1.0) G2: 1.1 (1.0) G3: 1.6 (1.2) G4: 1.5 (1.3) Diff in change over time (post-tx): G1 v G4: (p=0.017) EDE-Global, mean (SD) Pre-tx: G1: 2.8 (0.8) G2: 2.4 (0.8) G3: 2.7 (0.9) G4: 2.6 (0.9) Post-tx: G1: 2.1 (0.9) G2: 1.8 (0.8) G3: 2.3 (1.0) G4: 2.3 (0.9) Diff in change over time (post-tx): G1 v G4: (p=0.008) TFEQ-Disinhibition, mean (SD) Pre-tx: G1: 14.3 (1.5) G2: 13.6 (1.9) G3: 13.8 (1.7) G4: 13.6 (2.0)	Nonstatistically sig diff in change over time (post-tx): BMI	Nonstatistically sig diff in change over time (post-tx): IDS-SR RSE IWQOL

Table 20. Binge-eating disorder treatment results: Outcomes of included cognitive behavioral therapy versus waitlist trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Peterson et al., 1998[66] (continued)	Abstinence, % Pre-tx: NR Post-tx: G1: 51.7% G2: 33.3% G3: 17.9% G4: 10.1% Diff at post-tx: (p<0.001) G1, G2 v G4 (p<0.008) G1 v. G3: (p<0.008)	Post-tx: G1: 11.9 (3.4) G2: 12.2 (2.9) G3: 12.7 (2.3) G4: 13.4 (2.1) Diff in change over time (post-tx): G1, G2 v G4: (p=0.001)		
Tasca et al., 2006[140] G1: **PIPT-TL** (48/37/35/37) (Not included in this comparison) G2: **CBT-TL** (47/37/32/37) G3: **Waitlist** (40/33) ITT sample Hierarchical linear model with restricted maximum likelihood method of estimation	Binge days/wk, mean (SD) Pre-tx: G2: 3.95 (1.70) G3: 4.00 (1.52) Post-tx: G2: 0.57 (0.93) G3: 3.58 (2.03) Diff in change over time (post-tx): G2 v G3: (p<0.001) Abstinence, % Pre-tx: NR Post-tx: G2: 62.2% G3: 9.1% Diff at post-tx: G2 v G3: (p<0.001) Improved (< 2 binge days/wk), % Pre-tx: NR Post-tx: G2: 86.5% G3: 12.1% Diff in change over time (post-tx): G2 v G3 (p<0.001)	TFEQ-Restraint, mean (SD) Pre-tx: G2: 6.69 (4.01) G3: 8.10 (4.20) Post-tx: G2: 8.52 (3.75) G3: 6.63 (3.82) Diff in change over time (post-tx): G2 v G3: (p=0.02) TFEQ-Hunger, mean (SD) Pre-tx: G2: 10.32 (2.89) G3: 9.95 (3.44) Post-tx: G2: 7.73 (3.82) G3: 9.54 (3.37) Diff in change over time (post-tx): G2 v G3: (p=0.014)	Nonstatistically sig diff in change over time (post-tx): BMI	IIP total, mean (SD) Pre-tx: G2: 1.56 (0.53) G3: 1.53 (0.61) Post-tx: G2: 1.29 (0.61) G3: 1.50 (0.67) Diff in change over time (post-tx): G2 v G3: (p=0.024) Nonstatistically sig diff in change over time (post-tx): CESD RSE

ANOVA = analysis of variance; BDI = Beck Depression Inventory; BED = binge-eating disorder; BES = Binge Eating Scale; BMI = body mass index; BSI = Brief Symptom Inventory; BSQ = body shape questionnaire; CBT = cognitive behavioral therapy; CBTgsh = cognitive behavioral therapy, guided self-help; CBT-PTL = cognitive behavioral therapy, partially therapist-led; CBTpsh = cognitive behavioral therapy, pure self-help; CBTssh = cognitive behavioral therapy, structured self-help; CBT-TL = cognitive behavioral therapy, therapist led; CESD = Center for Epidemiologic Studies Depression Scale; DSM = Diagnostic and Statistical Manual, Fourth Edition; EB-IV = Eating Behaviors, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; EDI-2 = Eating Disorder Inventory, Second Edition; EDO = Eating Disorders in Obesity; HDRS = Hamilton Depression Rating Scale; G = group; GSI = Global Severity Index; IDS-SR = Inventory of Depressive Symptoms – Self-Report; IIP = Inventory of Interpersonal Problems; ITT = intent to treat; IWQOL = Impact of Weight on Quality of Life; RCT = randomized controlled trial; min = minute(s); mo = months; NR = not reported; OBE = objective binge episodes; OOE = objective overeating episode; PIPT-TL = psychodynamic interpersonal therapy,

therapist-led; RSE = Rosenberg Self-Esteem; SBE = subjective binge episodes; SCID/IP = Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Version; SCL-90 = Symptom Checklist 90; SD = standard deviation; TFEQ = Three Factor Eating Questionnaire; UK = United Kingdom; US = United States; wks = weeks; yr = year

Table 21. Binge-eating disorder treatment results: Outcomes of included cognitive-behavioral therapy versus active control or usual care

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[68] G1: **CBTgsh** (37/37) G3: **Active Control** (15/15) ITT sample ANCOVA Maximum likelihood mixed model	Binge episodes/mo (SR) Pre-tx: NR Post-tx: G1: 6.8 (6.1) G3: 3.8 (6.1) Diff in change over time: G1 v G3: (p=0.019) Binge episodes/mo (EDEQ) Pre-tx: G1: 12.1 (9.0) G3: 14.0 (4.8) Post-tx: G1: 2.8 (5.1) G3: 8.1 (6.9) Diff in change over time: G1 v G3: (p=0.014) Abstinence, % (Diary): Pre-tx: NR Post-tx: G1: 46% G3: 13.3% Diff at post-tx: G1 v G3: (p=0.03) Abstinence, % (EDEQ): Pre-tx: NR Post-tx: G1: 59.5% G3: 26.7% Diff at post-tx: G1 v G3: (p=0.03)	Eating concern (EDEQ), mean (SD) Pre-tx: G1: 3.5 (1.2) G3: 2.8 (1.3) Post-tx: G1: 1.8 (1.3) G3: 2.4 (1.0) Diff in change over time: G1 v G3: (p=0.017) TFEQ-Hunger, mean (SD) Pre-tx: G1: 9.8 (3.0) G3: 9.3 (3.5) Post-tx: G1: 6.6 (3.5) G2: 8.2 (3.7) G3: 9.7 (3.0) Diff in change over time: G1 v G3: (p=0.001) TFEQ-Disinhibition, mean (SD) Pre-tx: G1: 12.8 (2.8) G3: 12.9 (2.5) Post-tx: G1: 11.2 (3.6) G3: 12.7 (2.4) Diff in change over time: G1 v G3: (p=0.003) TFEQ-Restraint, mean (SD) Pre-tx: G1: 9.1 (4.7) G3: 7.3 (3.6) Post-tx: G1: 10.8 (4.5) G3: 7.1 (5.1) Diff in change over time: G1 v G3: (p=0.037)	Nonstatistically sig diff in change over time: BMI	Nonstatistically sig diff in change over time: BDI RSE

Table 21. Binge-eating disorder treatment results: Outcomes of included cognitive-behavioral therapy versus active control or usual care (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[68] (continued)		Restraint (EDEQ) Rapid responders, EMM (SE) G1: 1.9 (0.2) G2: 2.8 (0.2) Diff in change over time: (p=0.004) Nonstatistically sig diff in change over time: Weight concern Shape concern		
Grilo et al., 2013[143] G1: **CBTpsh+UC** (24/24) G2: **UC** (24/24) ITT sample Chi square Mixed model analysis	Binge episodes/mo (EDEQ) Pre-tx: G1: 13.83 (8.65) G2: 9.74 (7.11) Post-tx: G1: 4.54 (5.01) G2: 8.21 (9.36) Diff in change over time (post-tx): (p=0.03) Nonstatistically sig diff at post-tx: Abstinence Binge episodes/mo (EDE)	Nonstatistically sig diff in change over time (post-tx): EDE-Global EDEQ-Global	Nonstatistically sig diff in change over time (post-tx): BMI	Nonstatistically sig diff in change over time (post-tx): BDI

ANCOVA = analysis of covariance; BDI = Beck Depression Inventory; BMI = body mass index; BWLgsh = behavioral weight loss, guided self-help; CBTgsh = cognitive behavioral therapy, guided self-help; EDEQ = Eating Disorder Examination Questionnaire; G = group; ITT = intent to treat; NR = not reported; RSE = Rosenberg Self-Esteem; SD = standard deviation; TFEQ = Three Factor Eating Questionnaire

Binge-Eating Outcomes

Of the five trials comparing therapist-led CBT with waitlist control (Table 20), all reported better binge-eating outcomes for CBT. In three of the trials, the benefit was evident for both binge frequency and abstinence outcomes; one additional trial each demonstrated benefit in binge frequency and abstinence.

Four trials found that therapist-led CBT produced greater reduction in binge frequency at the end of treatment than waitlist control.[65,66,140,142] the binge frequency point estimate result of the fifth trial[144] was consistent with this finding, but the difference compared with waitlist control was not statistically significant. Similarly, in four trials that reported on abstinence at the end of treatment,[65,66,140,144] a significantly greater percentage of participants were abstinent in the therapist-led group than in control. The two partially therapist led CBT trials[65,66] and the two structured self-help trials[65,66] demonstrated a similar pattern of results: a greater decrease in

binge frequency and a greater percentage of participants who were abstinent among those in the CBT group than control.

In the four CBT self-help trials, binge-eating outcomes were significantly better at the end of therapy for participants in the CBT group regardless of the self-help format.[65,66,71,74] In two trials, structured self-help CBT was more effective than waitlist in reducing binge frequency,[65,66] However, only one of these trials found that a significantly greater percentage of participants receiving the self-help CBT were abstinent.[66] Both of the two guided self-help CBT trials (one with a facilitator[71] and one via the Internet[74]) and the one pure self-help CBT trial[71] demonstrated significantly greater decreases in binge frequency and higher abstinence rates.

Finally (Table 21), one trial compared guided self-help CBT with active control[68] and one compared pure self-help CBT with usual care.[143] Both kinds of CBT produced significantly greater reductions in binge frequency at the end of treatment. Only the guided self-help trial had a greater percentage of participants who were abstinent.

Eating-related Psychopathology Outcomes

Compared with waitlist (Table 20), therapist-led CBT was associated with greater improvements in eating-related psychopathology at the end of treatment (as measured by the EDE and the TFEQ) in four of five trials.[65,66,140,141] In the fifth trial, the direction of effect also favored the intervention but the two groups did not differ significantly.[142] Outcomes comparing partially therapist-led CBT with waitlist were not consistent. Partially therapist-led CBT was associated with greater improvements in eating-related psychopathology at the end of treatment (as measured by the EDE and TFEQ) in one of two trials;[65] however, in the second trial, the two groups did not differ significantly, but the direction of the effect also favored CBT.[66]

The outcomes in the two trials comparing patients receiving pure self-help CBT with those on a waitlist were not consistent. One found nonsignificant differences between patient groups;[65] the other reported significantly greater improvement in the CBT-PTL arm on two of three subscales of the TFEQ.[66]

The effect of CBT self-help varied across trials. In the two trials comparing structured self-help CBT with waitlist,[65,66] one found a treatment benefit limited to greater reductions in two TFEQ subscales (hunger and disinhibition).[66] In contrast, both of the guided self-help trials and the pure self-help trial reported a greater effect of CBT in reducing eating-related psychopathology at the end of treatment.[71,74]

Similarly (Table 21), the effect of CBT self-help compared with active control or usual care varied across trials and outcome measures. Guided self-help significantly reduced eating concerns, hunger, and disinhibition, and increased cognitive restraint compared with active control.[68] However, pure self-help combined with usual care was not more effective than usual care alone in reducing eating-related psychopathology, as measured in the EDE-Q global score, at the end of the trial.[143]

Weight Outcomes

Across all comparisons of CBT completely or partially led by therapists, weight outcomes did not significantly differ between treatment and waitlist arms at the end of treatment (Table 20).[65,66,140-142]

The self-help trials generally demonstrated a pattern similar to that for the therapist-led trials. All but one of the trials[74] found no differences in weight outcomes between treatment and

waitlist;[65,66,71] the lone exception was a greater reduction in BMI at the end of treatment in those randomized to Internet-based guided self-help CBT.[74]

Similarly, weight outcomes did not differ in trials comparing self-help with active control[68] or with usual care[143] (Table 21).

General Psychological Outcomes

The therapist-led CBT groups and waitlist control groups did not differ on depression outcomes in four of five trials at post-treatment assessment (Table 20).[65,66,140,142] One small trial (N=52) reported significantly better results in the CBT group on the Beck Depression Inventory (BDI).).[141] Although both groups demonstrated a decrease in BDI scores, those receiving CBT had lower self-reported depression scores at post-treatment than those assigned to waitlist. The two trials comparing partially therapist-led CBT and waitlist groups also reported no difference in depression outcomes at post-treatment.[65,66]

CBT self-help and waitlist did not differ on depression outcomes (Table 20), whether delivered in the form of structured self help,[65,66] Internet-based guided self-help,[74] or pure self help.[71] Only the in vivo guided self-help trial demonstrated a significant difference between the intervention and waitlist groups; at post-treatment, those randomized to treatment reported significantly lower depression scores than waitlist.[71] However, the outcome measure used in this trial was the Global Severity Index (GSI) from the Brief Symptom Inventory;[39] this instrument measures global psychological distress, and the authors did not report data specifically on the depression subscale.

Guided self-help CBT was not more effective than active control;[68] pure self-help CBT plus usual care was not more effective than usual care alone[143] in reducing symptoms of depression (Table 21).

Self-esteem outcomes were reported in six trials (Table 20);[65,66,68,74,140,142] general psychological distress (measured through the Global Severity Index) were documented in three trials.[71,74,142] Five of the self-esteem trials failed to find significant differences between the CBT and the waitlist groups.[65,66,68,140,142] The exception was the trial comparing Internet-based guided-self-help CBT with waitlist controls; the intervention group had a greater improvement in self-esteem.[74] Three trials reported on GSI changes following four different CBT formats compared with waitlist: only the Internet-based approach produced significantly greater reductions in psychological distress.[74]

Other Outcomes

The nine trials reported on a range of other outcomes; the most common one was quality of life.[65,74] Participants assigned to Internet-based guided self-help reported better quality of life at the end of treatment than those in the waitlist group.[74]

Behavioral Interventions: Cognitive Behavioral Therapy versus Cognitive Behavioral Therapy Variants

Description of Studies

The variations of CBT discussed in this section included the therapist-led formats already described for the trials reported on above. Some are equivalent to those already discussed; others are subsets of those basic formats.

All but one of the therapist-led CBT approaches (including partially therapist-led) are group-based. Subsets include CBT with exposure (involving a body image exposure component), CBT with cognitive restructuring (involving a body image cognitive restructuring component), CBT plus ecological momentary assessment (which is an intensive monitoring schedule aimed at increasing adherence with self-monitoring), and therapist-led CBT.

The CBT self-help options are as described earlier. Structured self-help is a group-based approach in which members first watch a videotape and then participate in discussions led by a group member. Pure self-help and structured self help are both individual-based options. Pure self-help has no facilitator, but participants receive a copy of a treatment manual (often Overcoming Binge Eating[139]) and are instructed to follow the advice for a specific period of time (e.g., 12 weeks) with no further advice or contact. By contrast, in guided self-help, participants receive the same manual but also have regular, brief (e.g., six to eight 25-minute) meetings with a facilitator to help with using the manual.

Seven trials compared CBT delivered in one format with CBT delivered in a different format (Table 22 from below).[65-67,71,147-149] Three of the seven trials had more than two treatment arms and are represented in multiple comparisons of CBT variants.[65-67] Two of the seven trials also randomized a portion of their participants to a waitlist control group;[65,66] we presented those results above and here document only evidence relating to the CBT comparisons.

Table 22. Characteristics of included behavioral therapy-only intervention studies: Cognitive behavioral therapy versus variants of cognitive behavioral therapy

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Hilbert et al., 2004[147] Germany Outpatient primary care RCT Low	DSM-IV (EDE) or subthreshold BED G1: 14 G2: 14 7 mo (4mo) Females only Subthreshold = DSM-5 BED Mean age: 40.35 Mean BMI: 35.2	G1: **CBT-E-TL**: manualized, CBT, 4 sessions and homework assignments on body exposure for body image; 3 preparatory individual sessions followed by 19, 120-min, weekly group sessions, followed by 3, 120-min group sessions every 3rd week G2: **CBT-C-TL**: manualized, CBT, 4 sessions and homework assignments on cognitive restructuring for body image; 3 individual preparatory sessions, followed by 19, 120-min, weekly group sessions, followed by 3, 120-min group sessions every 3rd week Co-interventions: none	Binge • Binge per week (EDE) • BED improvement • SubBED improvement • % Improved (EDE) • % Abstinent (EDE) Eating-related • EDE, 4 subscales Weight • BMI Psychological • Depression (BDI) • Body image (BSQ)

Table 22. Characteristics of included behavioral therapy-only intervention studies: Cognitive behavioral therapy versus variants of cognitive behavioral therapy (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
LeGrange et al., 2002[148] United States Outpatient RCT Medium	DSM-IV G1: 22 G2: 19 12 weeks (12 mo) BMI ≥27 kg/m^2 Mean age: 44.2 Females: 100% Non-white: 7% Mean BMI: 36.7 Mean depression (BDI): 20.3	G1: **CBT-TL**, 12 weeks of sessions, length and frequency of sessions: NR. G2: **CBT+EMA-TL**, identical to group CBT plus patient required to systematically and intensively record mood, events, thoughts, and eating behaviors during first 2 weeks of treatment (EMA). Patients trained in EMA diary-keeping, given detailed instruction of DSM-IV definition of binges, and required to wear wristwatch that beeped to prompt them to add diary entries. Binge trigger protocols generated for each patient using diary entries and to identify appropriate individualized strategies to curb future binge eating. 12 weeks of sessions, length and frequency of sessions: NR. Cointerventions: None	Binge • Prevalence of BED diagnosis • Frequency of binge episodes in previous 28 days • Frequency of binge episodes evaluated in previous 7 days Eating-related • EDEQ, 4 scales • TFEQ, 3 scales • EES, 3 scales Psychological • BDI • RSE Weight • BMI
Ricca et al., 2010[149] Italy Outpatient Low	DSM IV for BED or sub-threshold BED) G1: 72 G2: 72 24 wk (3 yr) Age 18-60 years Subthredhold BED: DSM-5 Mean age: 47 Female: 88% Mean BMI: 38.1 Any psychiatric co-morbidity: 54% Adjustment disorder with depressed mood: 33% OCD: 3% Panic disorder: 12% Anxiety disorder: 12%	G1: **ICBT-TL**: 22, 50-minute individual sessions of manualized CBT for 24 weeks G2: **GCBT-TL**: 20, 60-minute group sessions of manualized CBT for 22 weeks.	Binge • Binge episodes/mo (EDE; DSM-IV-TR) • ED full recovery (< DSM-IV criteria or subthreshold BED) • ED diagnostic change • Treatment resistant Eating-related • SCL-90 GSI • BES • EES • EDE global, 4 scales • Onset of frequent compensatory behaviors (posttreatment only) Psychological • BDI • STAI

Table 22. Characteristics of included behavioral therapy-only intervention studies: Cognitive behavioral therapy versus variants of cognitive behavioral therapy (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Ricca et al., 2010[149] (continued)			Weight • BMI • Weight loss >5% of initial BMI • Weight loss >10% of initial BMI
Peterson et al., 1998[66] United States Outpatient RCT Medium	DSM IV (Structured clinical interview) G1: 16 G2: 19 G3: 15 G4: 11 8 wks Adult females Mean age: 42.4 Non-white: 4% Mean BMI: 34.7	G1: **CBT-TL:** 14, 60-minute sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half psychoeducational; 2nd half therapist led group discussion G2: **CBT-PTL:** 14, 60-minute sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half viewed videotape of same psychologist in therapist-led psychoeducational condition; 2nd half therapist led group discussion G3: **CBTssh:** 14, 60-minute sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half viewed videotape of same psychologist in therapist-led psychoeducational condition; 2nd half one group member assigned to facilitate group discussion G4: **Waitlist control** Co-intervention: none	Binge: • OBE per week (EB IV) • Total episodes – OBE and SBE per week • Hours binge eating per week Eating-related • BES • TFEQ, 3 scales • BSQ Psychological • HDRS • RSEQ Weight • BMI

Table 22. Characteristics of included behavioral therapy-only intervention studies: Cognitive behavioral therapy versus variants of cognitive behavioral therapy (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Peterson et al, 2001[67] United States Outpatient RCT Medium	DSM-IV (SCID-P) G1: 16 G2: 19 G3: 15 8 wks (1 mo, 6mo, 12mo) Adult females Mean age: 42.9 Non-white: 4% Mean BMI: 34.1	G1: **CBT-TL:** 14, 60-minute sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half psychoeducational; 2nd half therapist led group discussion G2: **CBT-PTL:** 14, 60-minute sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half viewed videotape of same psychologist in therapist-led psychoeducational condition; 2nd half therapist led group discussion G3: **CBTssh:** 14, 60-minute sessions over 8 weeks; bi-weekly first 6 weeks then weekly for last 2 weeks; 1st half viewed videotape of same psychologist in therapist-led psychoeducational condition; 2nd half one group member assigned to facilitate group discussion Co-intervention: none	Binge: • OBE per week (EB IV) • Total episodes – OBE and SBE per week • Hours binge eating per week Eating-related • BES • TFEQ, 3 scales • BSQ Psychological • BDI • HDRS • RSEQ Weight • BMI
Peterson et al., 2009[65] United States Clinical sites RCT Medium	DSM IV G1: 60 G2: 63 G3: 67 G4: 69 20 wks (6 mo, 12 mo) BMI ≥ 25 Mean age = 47.1 Females = 88% Non-white = 4% Mean BMI = 39 Anti-depressant medication = 79%	G1: **CBT-TL**: 15 sessions, weekly for 1st 10 weeks, then bi-weekly. Therapist provided psychoeducation G2: **CBT-PTL:** 15 sessions, weekly for 1st 10 weeks, then bi-weekly. Sessions consisted of watching psychoeducational video and psychotherapist led homework review and discussion during second half. G3: **CBTssh**: 15 sessions, weekly for 1st 10 weeks, then bi-weekly. Sessions consisted	Binge • Frequency of OBE episodes (EDE) • OBE in past 28 days • Abstinence from OBEs in past 28 days Eating-related • EDE, global, 4 scores • TFQ, 3 scores Psychological • IDS-SR – Depression Weight • BMI

Table 22. Characteristics of included behavioral therapy-only intervention studies: Cognitive behavioral therapy versus variants of cognitive behavioral therapy (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Peterson et al., 2009[65] (continued)		of watching psychoeducational video and homework review and discussion led my members on rotating basis. G4: **Waitlist control**: group received therapist-led group CBT at end of 20-week waiting period Co-Intervention: Antidepressant medication	
Carter & Fairburn, 1998[71] United Kingdom Outpatient RCT Medium	DSM IV (EDE) G1: 24 G2: 24 G3: 24 12 wks (6 mo) Female Mean age: 40 Non-white: 3% Mean BMI: 31.6	G1: **CBTpsh**: Participants were asked to read Overcoming Binge Eating and follow its self-help program for 12 weeks. G2: **CBTgsh**: Nonspecialist therapists led between 6 and 8 25-minute sessions to support participants in using Overcoming Binge Eating book G3: **Waitlist control** Co-intervention: none	Binge • Binge eating frequency past 28 days (EDE) Eating-related • EDE, global, 4 scores Psychological • BSI, 1 scale • RSEQ Weight • BMI

BDI = Beck Depression Inventory; BED = binge-eating disorder; BES = Binge Eating Scale; BMI = body mass index; BSI = Brief Symptom Inventory; BSQ = body shape questionnaire; CBT = cognitive behavioral therapy; CBT-C-TL = cognitive behavioral therapy – cognitive restructuring, therapist-led; CBT-E-TL = cognitive behavioral therapy – exposure, therapist-led; CBT+EMA-TL = cognitive behavioral therapy plus ecological momentary assessment; CBTgsh = cognitive behavioral therapy, guided self-help; CBTpsh = cognitive behavioral therapy, pure self-help; CBT-PTL = cognitive behavioral therapy, partially therapist-led; CBTssh = cognitive behavioral therapy, structured self-help; CBT-TL = cognitive behavioral therapy, therapist led; DSM = Diagnostic and Statistical Manual; EB-IV = Eating Behaviors, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; EES = Emotional Eating Scale; EMA = ecological momentary assessment; GCBT = group cognitive behavioral therapy, therapist-led; G = group; HDRS = Hamilton Depression Rating Scale; ICBT = individual cognitive behavioral therapy, therapist-led; IDS-SR = Inventory of Depressive Symptoms – Self-Report; RCT = randomized controlled trial; mo = months; N = number; NR = not reported; OBE = objective binge episodes; OCD = obsessive compulsive disorder; RSE = Rosenberg Self-Esteem; SCL-90 = Symptom Checklist 90; SD = standard deviation; SBE = subjective binge episodes; STAI = State Trait Anxiety Inventory; TFEQ = Three Factor Eating Questionnaire; TR = Text Revision; tx = treatment

These variations resulted in a total of seven comparisons including four therapist led comparisons: exposure versus cognitive restructuring;[147] therapist-led versus ecological momentary assessment;[148] individual versus group CBT led by a therapist;[149] and full versus partially therapist-led interventions.[65-67] In addition, this evidence base has several self-help comparisons: one for guided self-help versus pure self-help;[71] and two comparisons of therapist-led and structured self-help.

Most of these comparisons were restricted to single trials. The exceptions were repeated across the same three trials: full versus partially therapist-led; therapist-led versus structured self-help, and partially therapist-led versus structured self-help.[65-67]

A total of 655 participants were randomized in the seven trials. All participants met DSM-IV[65-67,71,148] or DSM-5[147,149] criteria for BED. Investigators did not report findings separately by DSM diagnosis, so we could not evaluate any evidence comparing treatment effectiveness by DSM version.

Participants ranged in age from 18 to 65 years. Most were overweight or obese (mean BMI range: 31.6 to 39), female (≥ 88 percent across all studies), and white (93 percent to 97 percent in the five trials that reported race).[65-67,71,148]

Seven trials provided seven comparisons of interest. Only three comparisons, however, were repeated; these were therapist-led versus partially therapist-led CBT; therapist-led versus structured self-help, and partially therapist-led versus structured self-help. Table 23 documents the number of trials and numbers of subjects available as evidence for each of the treatment comparisons and outcomes, and it gives the strength of evidence grades.

Table 23. Strength of evidence for outcomes of interventions for cognitive behavioral trials versus cognitive behavioral trials

Treatment Comparison	Binge Eating	Eating-Related Psychopathology	Weight	Psychological Outcomes
Full versus partially therapist-led	**Low** 3 RCTs (N=193) No difference	**Low** 3 RCTs (N=193) No difference	**Low** 3 RCTs (N=193) No difference	**Low** 3 RCTs (N=193) No difference
Structured self-help versus therapist-led	**Insufficient** 3 RCTs (N=199) Mixed results	**Low** 3 RCTs (N=199) No difference	**Low** 3 RCTs (N=199) No difference	**Low** 3 RCTs (N=199) No difference
Structured self-help versus partially therapist-led	**Low** 3 RCTs (N=198) No difference	**Low** 3 RCTs (N=198) No difference	**Low** 3 RCTs (N=198) No difference	**Low** 3 RCTs (N=198) No difference

CBT-PTL = cognitive behavioral therapy, partially therapist-led; CBTssh = cognitive behavioral therapy, structured self-help; CBT-TL = cognitive behavioral therapy, therapist led; vs = versus

Key Points

- Binge-eating outcomes did not differ across comparisons of variations in therapist-led CBT interventions with one exception favoring therapist-led over structured self-help in one trial (low strength of evidence for no difference).
- BMI outcomes did not differ across types of CBT (moderate strength of evidence for no difference).
- Depression symptom outcomes did not differ across types of CBT (moderate strength of evidence of no difference).
- The strength of evidence is insufficient to determine the comparative effectiveness of several comparisons of variants on therapist-led or self-help approaches because these formats were studied in single, small sample trials.

Detailed Synthesis

Each of the seven trials reported on binge frequency; six reported on abstinence.[65-67,71,147,148] The trial that did not report abstinence[149] instead reported recovery (no longer meeting DSM-IV criteria for BED), various diagnostic shifts (from threshold to subthreshold BED; from BED to bulimia nervosa), treatment resistance (no diagnostic crossover/shift), and relapse (meeting a

threshold diagnosis of BED or subthreshold BED at 3-year followup after full recovery as of the end of treatment. All seven trials reported on eating-related psychopathology, BMI, and depression outcomes. Outcomes were assessed at the close of therapy; five trials reported short-term followup (<12 months)[65,67,71,147,148] and one gave data on long-term followup (3 years).[149]

Binge-Eating Outcomes, Eating-related Psychopathology, Weight or Body Mass Index, Depression, and Other Outcomes

The collective body of results revealed nonsignificant differences between CBT variations on the primary outcomes of interest, regardless of the specific comparison (Table 23). Among the comparisons that were repeated across trials (full or partially therapist-led and comparisons with one or another of those options with structured self-help),[65-67] no differences were found on binge frequency or abstinence, eating-related psychopathology, BMI, or depression (generally all low strength of evidence). This same general pattern of nonsignificant results was also seen in the single trial comparisons with few exceptions (see Table 24).

Table 24. Binge-eating disorder treatment results: Outcomes of trials of various cognitive behavioral therapy options and variants

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Hilbert et al., 2004[147] G1: **CBT-E** (14/12) G2: **CBT-C** (14/12) ITT sample Multivariate generalized linear models for repeated measures	Nonstatistically sig diff in change over time (pre-tx to post-tx, pre-tx to 4mo): Binge episodes/mo Abstinence < 4 OBEs/mo % meeting BED diagnosis (DSM-IV)	Nonstatistically sig diff in change over time (pre-tx to post-tx, pre-tx to 4mo): Weight concern Shape concern Eating concern Restraint	Nonstatistically sig diff in change over time (pre-tx to post-tx, pre-tx to 4mo): BMI	Nonstatistically significant differences in change over time (pre-tx to post-tx, pre-tx to 4mo): BDI BSQ
Le Grange et al., 2002[148] G1: **CBT** (22/16) G2: **CBT+EMA** (19/12) ITT sample Repeated measures ANOVA	Nonstatistically sig diff in change over time (pre- to post-tx; pre-tx to 12mo): Binge episodes/wk (SR) Binge episodes/mo (EDEQ) 50% reduction in binge frequency Threshold BED Abstinence	Nonstatistically sig diff in change over time: (pre-to post-tx; pre-tx to 12mo): EDEQ TFEQ EES	Nonstatistically sig diff in change over time: (pre- to post-tx; pre-tx to 12mo): BMI	Nonstatistically significant differences in change over time: (pre- to post-tx; pre-tx to 12mo): BDI RSE

Table 24. Binge-eating disorder treatment results: Outcomes of trials of various cognitive behavioral therapy options and variants (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Ricca et al., 2010[149] G1: **ICBT** (72/69/68) G2: **GCBT** (72/68/66) ITT sample Chi-square (categorical) and Mann-Whitney U (continuous variables) Repeated measures ANOVA	Recovery rate (< DSM-IV BED dx), % Post-tx: G1: 33.3% G2: 16.7% Diff in change over time (post-tx): (p=0.02) Threshold BED to subthreshold BED, % Pre-tx: NR Post-tx: G1: 18.1% G2: 33.3% Diff in change over time (post-tx): (p=0.03) Nonstatistically sig diff in change over time (36mo): Binge episodes/mo Recovery rate (< DSM-IV BED dx) Threshold BED to subthreshold BED Tx resistance Threshold BED/subthresholdBED to BN Relapse	EDEQ-Total, median (quartiles) Pre-tx: G1: 3.2 (2.6; 3.7) G2: 3.0 (2.4; 3.6) Post-tx: G1: 2.1 (0.5; 3.3) G2: 2.9 (2.3; 3.5) 3-year F/up: G1: 1.3 (0.5; 3.1) G2: 2.7 (2.1; 3.4) Diff in change over time (post-tx; 36mo): (p<0.01) EDEQ-Weight, median (quartile) Pre-tx: G1: 3.5 (2.6; 4.1) G2: 3.4 (2.6; 4.0) Post-tx: G1: 3.5 (0.3; 4.5) G2: 3.3 (2.6; 4.2) 3-year F/up: G1: 1.0 (0.2; 3.4) G2: 3.2 (2.2; 4.2) Diff in change over time: (p<0.01) EDEQ-Shape, median (quartile) Pre-tx: G1: 4.5 (4.1; 5.2) G2: 4.4 (3.3; 5.1) Post-tx: G1: 3.5 (0.3; 4.5) G2: 4.2 (3.2; 5.0) 3-year F/up: G1: 1.3 (0.3; 4.3) G2: 4.0 (3.0; 5.0) Diff in change over time: (p<0.01) Nonstatistically sig diff in change over time (post-tx; 36mo): EDEQ Eating concern EDEQ Restraint	Nonstatistically sig diff in change over time (post-tx, 36mo): BMI	Nonstatistically sig diff in change over time (post-tx, 36mo): SCL-90 BDI STAI

Table 24. Binge-eating disorder treatment results: Outcomes of trials of various cognitive behavioral therapy options and variants (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge--Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Peterson et al., 1998[66] G1: **CBT-TL** (16/14) G2: **CBT-PTL** (19/17) G3: **CBTssh** (15/11) G4: **Waitlist control** (11/9) (Not included in this comparison) ITT sample Random regression analysis ANCOVA	Nonstatistically sig diff at post-tx: Total binges OBEs Hours binged Total binge abstinence OBE abstinence Hours binged abstinence	Nonstatistically sig diff at post-tx: TFEQ-Restraint TFEQ-Disinhibition TFEQ-Hunger BES	Nonstatistically sig diffsignificant differences at post-tx: BMI	Nonstatistically sig diffsignificant difference at post-tx: HDRS RSE BSQ
Peterson et al., 2001[67] G1: **CBT-TL** (16/14/11/10/12) G2: **CBT-PTL** (19/17/15/11/13) G2: **CBTssh** (16/13/12/12/12) ITT sample Mixed effects model Chi-square	Nontatistically sig diff in change over time (post-tx, 12mo): Total binges OBEs Hours binged Abstinence (OBE, total) Subthreshold DSM-IV BED	Nontatistically sig diff in change over time (post-tx; 12mo): TFEQ-Restraint TFEQ-Disinhibition TFEQ-Hunger	Nontatistically sig diff in change over time (post-tx, 12mo): BMI	Nontatistically sig diff in change over time (post-tx; 12mo): BDI BSQ RSE

Table 24. Binge-eating disorder treatment results: Outcomes of trials of various cognitive behavioral therapy options and variants (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge--Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Peterson et al., 2009[65] G1: **CBT-TL** (60/53/40/25) G2: **CBT-PTL** (63/43/38/30) G3: **CBTssh** (67/40/39/36) G4: **Waitlist control** (Not included in this comparison) (69/56)	Binge episodes/mo, mean (SD) Pre-tx: G1: 24.6 (18.7) G2: 21.9 (12.3) G3: 22.4 (13.7) Post-tx: G1: 6.3 (12.3) G2: 9.7 (12.4) G3: 11.9 (13.2) Diff in at post-tx: G1 v. G3: (p<0.008) Binge days/mo, mean (SD) Pre-tx: G1: 16.0 (6.9) G2: 16.4 (6.5) G3: 16.4 (6.8) Post-tx: G1: 4.4 (7.3) G2: 7.6 (8.4) G3: 9.6 (8.6) Diff at post-tx: G1 v G3: (p<0.008) Abstinence, % Pre-tx: NR Post-tx: G1: 51.7% G2: 33.3% G3: 17.9% Diff at post-tx: G1 v. G3: (p<0.008) Nonstatistically sig diff at 6mo, 12mo: Abstinence Binge days/mo Binge episodes/mo	Nonstatistically sig diff at post-tx, 6mo, 12mo: TFEQ-Restraint TFEQ-Hunger TFEQ-Disinhibition EDE-Weight concern EDE-Shape concern EDE-Eating concern EDE-Restraint EDE-Global	Nonstatistically sig diff at post-tx, 6mo, 12mo: BMI	Nonstatistically sig diffsignificant differences at post-tx, 6mo, 12mo: IDS-SR RSE IWQOL

Table 24. Binge-eating disorder treatment results: Outcomes of trials of various cognitive behavioral therapy options and variants (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge--Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Carter et al., 1998[71] G1: **CBTpsh** (NR) G2: **CBTgsh** (NR) G3: **Waitlist** (NR) (Not included in this comparison) Total N = 72 ITT sample Repeated measures ANOVA (G1, G2, G3; pre- v post-tx) Repeated measures ANOVA (G1 v G2; pre- v post-tx v 3mo v 6mo)	Nonstatistically sig diff in change over time (post-tx, 3mo, 6mo): Binge episodes/mo Abstinence	Restraint, mean (SD) Pre-tx: G1: 2.4 (1.5) G2: 2.5 (1.4) Post-tx: G1: 2.1 (1.4) G2: 1.2 (1.3) Diff in change over time: (p=0.006) 3mo: G1: 1.9 (1.6) G2: 1.0 (1.0) Diff in change over time: (p=0.01) 6mo: G1: 2.0 (1.6) G2: 1.3 (1.2) Nonstatistically sig diff in change over time (post-tx, 3, 6mo): Weight concern Shape concern Eating concern Global score Nonstatistically sig diff in change over time (6mo): Restraint	Nonstatistically sig diff in change over time (post-tx, 3, 6mo): BMI	Nonstatistically sig diff in change over time (post-tx, 3, 6mo): GSI

ANCOVA = analysis of covariance; ANOVA = analysis of variance; BDI = Beck Depression Inventory; BED = binge-eating disorder; BES = Binge Eating Scale; BMI = body mass index; BSI = Brief Symptom Inventory; BSQ = body shape questionnaire; CBT-C-TL = cognitive behavioral therapy – cognitive restructuring, therapist-led; CBT-E-TL = cognitive behavioral therapy – exposure, therapist-led; CBT+EMA-TL = cognitive behavioral therapy plus ecological momentary assessment; CBTgsh = cognitive behavioral therapy, guided self-help; CBTpsh = cognitive behavioral therapy, pure self-help; CBT-PTL = cognitive behavioral therapy, partially therapist-led; CBTssh = cognitive behavioral therapy, structured self-help; CBT-TL = cognitive behavioral therapy, therapist led; diff = difference; DSM = Diagnostic and Statistical Manual; EB-IV = Eating Behaviors, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; EES = Emotional Eating Scale; EMA = ecological momentary assessment; GCBT-TL = group cognitive behavioral therapy, therapist-led; HDRS = Hamilton Depression Rating Scale; ICBT-TL = individual cognitive behavioral therapy, therapist-led; IDS-SR = Inventory of Depressive Symptoms – Self-Report; ITT = intent to treat; GCBT-TL = group cognitive behavioral therapy, therapist-led; RCT = randomized controlled trial; mo = months; N = number; NR = not reported; OBE = objective binge episodes; RSE = Rosenberg Self-Esteem; SCL-90 = Symptom Checklist 90; SD = standard deviation; SBE = subjective binge episodes; STAI = State Trait Anxiety Inventory; TFEQ = Three Factor Eating Questionnaire; TR = Text Revision; tx = treatment; US = United States; v = versus; wk = week

Behavioral Interventions: Cognitive Behavioral Therapy Versus Behavioral Weight Loss

Description of Studies

Four trials compared CBT with behavioral weight loss (BWL) approaches;[68,69,150,151] one also compared CBT and BWL with CBT plus BWL (Table 25).[69] The CBT format varied across trials and included both therapist-led (TL)[69,150] and guided self-help (gsh),[68,151] yielding the following treatment comparisons: CBT-TL versus BWL-TL;[69,150] CBT-TL+BWL-TL versus BWL-TL;[69] CBTgsh versus BWLgsh;[68] and CBTgsh versus BWL-TL.[151] A total of 410 participants were included in the four trials: 205 in the TL trials and 205 in the gsh trials. Treatment duration ranged from 8[68] to 52[150] weeks, and followup ranged from 4 weeks[68] to 6 years.[152] All participants were adults (ages 18 to 77 years) who met DSM-IV criteria for BED. The trials comprised mostly overweight or obese patients (mean BMI range: 34 to 38.8); most were white (77 percent to 82 percent) and female (67 percent to 89 percent). The one trial that did not report race was conducted in Switzerland.[150]

Table 25. Characteristics of trials of cognitive-behavioral therapy versus behavioral weight loss

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Munsch et al., 2007[150] Munsch et al., 2012[152a] Switzerland Outpatient RCT Medium	DSM-IV-TR (EDE) G1: 44 G2: 36 12 months (6 years)* Age: 18-70, BMI: 27-40 Mean age: 45.9 Female: 89% BMI: 34 (n=75) Current comorbidity axis 1: 41% Current depression: 10% Current anxiety disorders: 30%	G1: **CBT-TL**, 16 weekly, 90-minute group sessions and six monthly 90-minute follow-up group sessions; the last session was at 12 months after the end of active treatment; CBT followed Fairburn's manual[139] G2: **BWL-TL**, 16 weekly, 90-minute group sessions and six monthly 90-minute follow-up group sessions; the last session was at 12 months after the end of active treatment; followed "Weight loss with Xenical"[153] Co-interventions: None	Binge • Number of OBE days in past 28 days, per EDE • Number of weekly binges • Abstainer rates in past 28 days, per EDE • BED diagnosis Eating-related • EDE, 4 scores Psychological • BDI • BAI Weight • BMI
Grilo et al., 2011[69] Grilo et al., 2012[154] United Sates Outpatient RCT Medium	DSM-IV (SCID-I/P, EDE) G1: 45 G2: 45 G3: 35 24 wks (6mo, 12 mo) 18-60 years old; BMI range = 30-55	G1: **CBT-TL**: manualized group CBT, 16, 60-min sessions, over 24 weeks G2: **BWL-TL**: manualized group BWL (LEARN Manual), 16, 60-min sessions, over 24 weeks	Binge • Binge episodes/mo (EDE) • Remission Eating-related • EDE, 4 subscales and global score Weight • BMI • Weight (pounds) • Weight loss (pounds) Psychological • BDI

Table 25. Characteristics of trials of cognitive-behavioral therapy versus behavioral weight loss (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Grilo et al., 2011[69] Grilo et al., 2012[154] (continued)	Mean age: 44.8 Mean BMI: 38.8 Female: 67% Nonwhite: 23% Lifetime major depressive disorder: 43%	G3: **CBT-TL+BWL-TL**: manualized group CBT (16, 60-min sessions over 16 weeks) followed by manualized group BWL (16, 60-min sessions over 24 weeks) Co-interventions: None	
Grilo et al., 2005[68] Masheb & Grilo, 2007[146] United States Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G1: 37 G2: 38 G3: 15 (Not included in this comparison) 8 wks (4 wks) 18-60 years old; BMI ≥ 27 Mean age: 46.3 Mean BMI: 35.5 Female: 79% Nonwhite: 23% Any Axis I psychiatric disorder: 68.91%	G1: **CBTgsh**: CBT self-help manual[139] + 6, 15-20min, bi-weekly, individual clinician sessions over 12 weeks G2: **BWLgsh**: BWL self-help manual (LEARN)[155] + 6, 15-20min, bi-weekly, individual clinician sessions over 12 weeks G3: **Active control**: 6, 15-20 min, bi-weekly, individual clinician sessions over 12 weeks; focused on completion of self-monitoring Co-interventions: None	Binge • Binge episodes/mo (Diary, EDEQ) • Abstinence (Diary, EDEQ) Eating-related • EDEQ, 4 subscales • TFEQ-Hunger • TFEQ-Restraint • TFEQ-Disinhibition Weight • BMI Psychological • BDI • RSE
Wilson et al, 2010[151] Sysko et al., 2010[156] United States Outpatient RCT Medium	DSM IV (Interview) G1: 64 G2: 66 G3: 75 (Not included in this comparison) 24 wks (18 mo, 24 mo, 30 mo) >18 years old, BMI 27-45 Mean age: 48.4 Female: 85% Nonwhite: 18% Mean BMI: 36.4	G1: **BWL-TL**: 16 individual weekly sessions, then 4 sessions at 2-week intervals to encourage self-monitoring of exercise, fat intake, and (if necessary) caloric intake; program based on NIDDK's Diabetes Prevention Program. G2: **CBTgsh**: 10 treatment sessions under guidance of therapist; first 4 sessions were weekly, next 2 at 2week intervals, and last 4 at 4week intervals. Based on Overcoming Binge Eating, focus of tx is developing a regular pattern of moderate eating using self-monitoring, self-control strategies, and problem-solving.	Binge • Number binge days in the past 28 days (EDE) Eating-related • EDE, global, 4 scores Psychological • BDI • RSE Weight • BMI • Weight (kg) • 5% reduction in body weight

Table 25. Characteristics of trials of cognitive-behavioral therapy versus behavioral weight loss (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Wilson et al, 2010[151] Sysko et al., 2010[156] (continued)		G3: **IPT-TL**: 19 individual sessions delivered over 24 weeks (first 3 sessions during first 2 weeks, followed by 12 weekly sessions, and final 4 sessions at 2-week intervals). Treatment adapted for bulimia from one developed for depression and formulated for BED. Co-interventions: None	

BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BED = binge-eating disorder; BES = Binge Eating Scale; BMI = body mass index; BSI = Brief Symptom Inventory; BSQ = body shape questionnaire; BWLgsh = behavioral weight loss, guided self-help; BWL-TL = behavioral weight loss, therapist-led; CBT = cognitive behavioral therapy; CBTgsh = cognitive behavioral therapy, guided self-help; CBT-TL = cognitive behavioral therapy, therapist led; DSM = Diagnostic and Statistical Manual, Fourth Edition; EDE = Eating Disorder Examination Inventory; HDRS = Hamilton Depression Rating Scale; IPT-TL = interpersonal therapy, therapist-led; IDS-SR = Inventory of Depressive Symptoms – Self-Report; RCT = randomized controlled trial; LEARN = Lifestyle, Exercise, Attitude, Relationships, Nutrition; mo = months; N = number; NR = not reported; OBE = objective binge episodes; RSE = Rosenberg Self-Esteem; SCL-90 = Symptom Checklist 90; SD = standard deviation; SBE = subjective binge episodes; STAI = State Trait Anxiety Inventory; TFEQ = Three Factor Eating Questionnaire; TR = Text Revision; tx = treatment; wks = weeks

Two trials compared therapist-led CBT and BWL.[69,150] In these trials, CBT was provided in a group format and was based largely on Fairburn's treatment manual for BED.[139] The BWL arms differed across the two studies; one[69] was based on the Lifestyle, Exercise, Attitudes, Relationships, and Nutrition (LEARN) Program for Weight Management[155] and the other[150] was based on the treatment "Weight Loss with Xenical."[153] LEARN focuses on making lifestyle changes (e.g., goal-setting, dealing with pressures to eat, changing attitude) along with moderate caloric restriction and increased physical activity to promote weight loss. Weight Loss with Xenical was developed to foster weight management by instructing patients to normalize fat intake and achieve balanced nutrition. The LEARN trial randomized participants to 16 sessions of either CBT or BWL or to 16 sessions of CBT followed by 16 sessions of BWL (CBT+BWL), thus comparing two single-modality behavioral treatments with sequential behavioral treatment.[69]

The guided self-help trials compared CBT (based on Fairburn's manual[139]) with BWL (based on the LEARN program)[68] or with therapist-led BWL (adapted from the National Institute of Diabetes and Digestive and Kidney Diseases' Diabetes Prevention Program's manual[157]).[151] The Diabetes Prevention Program entails moderate caloric restriction and exercise to promote a weight loss goal of 7 percent of one's initial weight. Specific instructions are provided in terms of reducing fat intake and setting an exercise goal of 2.5 hours of moderate exercise per week, combined with self-monitoring of fat intake, calories, and exercise.

Key Points

The evidence comparing CBT and BWL interventions consisted of four trials. Two trials compared therapist-led formats and two trials compared guided self-help formats (Table 26).

Table 26. Strength of evidence for outcomes of cognitive behavioral therapy versus behavioral weight loss trials

Treatment Comparison	Binge-Eating[a]	Eating-related Psychopathology	Weight[b]	Depression
Therapist-led CBT vs. BWL	**Low** 2 RCTs (N=170) CBT better Binge frequency **Insufficient** 2 RCTs (N=170) Mixed results Abstinence	**Low** 2 RCTs (N=170) No difference	**Moderate** 2 RCTs (N=170) BWL better	**Low** 2 RCTs (N=170) No difference
Guided self-help CBT v. BWL	**Insufficient** 1 RCT (N=75) CBT better	**Insufficient** 1 RCT (N=75) CBT better	**Insufficient** 1 RCT (N=75) No difference	**Insufficient** 1 RCT (N=75) No difference
Guided self-help CBT v. Therapist-led BWL	**Insufficient** 1 RCT (N=130) No difference Binge frequency **Insufficient** 1 RCT (N=130) CBT better Abstinence (long-term followup)	**Insufficient** 1 RCT (N=130) BWL better (1 subscale)	**Insufficient** 1 RCT (N=130) BWL better (post-treatment) No difference (long-term followup)	**Insufficient** 1 RCT (N=130) No difference

[a] Unless otherwise noted, reflects binge frequency and abstinence outcomes; [b] Unless otherwise noted, reflects weight and BMI outcomes

BWL = behavioral weight loss; CBT = cognitive behavioral therapy; gsh = guided self-help; TL = therapist-led

For therapist-led interventions:

- For reducing binge frequency, CBT was better than BWL at the end of treatment and at 12-month followup (low strength of evidence for benefit of CBT).
- For abstinence, CBT and BWL did not differ in abstinence at end of treatment at 12-month or 6-year followup (low strength of evidence for no difference).
- For eating-related psychopathology, CBT and BWL outcomes were not significantly different (low strength of evidence for no difference).
- With regard to weight outcomes (BMI), BWL was better at reducing BMI than CBT (low strength of evidence for benefit).

For guided self-help interventions:

- Evidence was insufficient because all comparisons were limited to single trials.

For either type of intervention:

- For depression outcomes, nonsignificant differences were reported across all four trials (insufficient strength of evidence).

Detailed Synthesis

All four included trials reported on binge frequency, abstinence, eating-related psychopathology, BMI, and depression outcomes (Table 27). Three trials were limited to short-term followup (less than 12 months after treatment)[69,150,151] and two reported long-term (24-month)[151] and (6-year)[152] followup data. Two trials examined differences in binge-eating outcomes in rapid versus nonrapid responders;[146,154] one trial conducted latent class and latent transition analyses to examine factors associated with rapid response to treatment.[156]

Table 27. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus behavioral weight loss

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis Approach	Binge-Eating Outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Munsch et al., 2007[150] Munsch et al., 2012[152] G1: **CBT-TL** (44/31/30/30/29) G2: **BWL-TL** (36/27/27/24/23) ITT sample Linear mixed models Generalized linear mixed models (dichotomous and counted)	Binge episodes/wk (SR), mean (SD) Pre-tx: G1: 3.81 (3.47) G2: 4.10 (3.71) Post-tx: G1: 0.14 (0.45) G2: 1.15 (1.89) Diff at post-tx: (p<0.001) Diff at 12 mo: (p=0.045) Diff from post-tx to 72 mo: (p<0.001) Abstinence, N (%) Pre-tx: NR Post-tx: G1: 44 (41%) G2: 36 (58%) Diff at post-tx: (p=0.010) Diff in change from pre-tx to post-tx): (p<0.01)	Nonstatistically sig diff at post-tx; at 12 mo; change from pre- to post-tx; change from post-tx to 72mo): Weight concerns (EDE, EDEQ) Shape concerns (EDE, EDEQ) Eating concerns (EDE, EDEQ) Restraint (EDE, EDEQ) Global score (EDE, EDEQ)	BMI, mean (SD) Pre-tx: G1: 33.66 (4.31) G2: 34.36 (3.74) Post-tx: G1: 33.62 (4.70) G2: 33.08 (3.69) Diff at post-tx: (p<0.001) Diff from pre-tx to post-tx: (p<0.001) Nonstatistically sig diff in change from post-tx to 12mo, 72mo): BMI	BAI, mean (SD) Pre-tx: G1: 13.79 (12.95) G2: 10.74 (9.43) Post-tx: G1: 9.72 (10.15) G2: 11.07 (9.46) 12 mo: G1: 6.30 (10.10) G2: 11.00 (12.17) Diff at 12mo: (p=0.004) Nonstatistically sig at post-tx, 12mo: BDI FLZ SWE Nonstatistically sig diff in change over time (G1-G2: post-tx; G1-G2: 72mo): BDI
Munsch et al., 2007[150] (continued)	Nonstatistically sig diff at post-tx: Binge days Nonstatistically sig diff at 12mo: Abstinence Binge days Nonstatistically sig diff in change from pre- to post-tx; post-tx to 72mo: BED diagnosis Diff in change from post-tx to 72 mo: Abstinence Nonstatistically sig diff from pre- to post-tx: BED diagnosis			Nonstatistically sig diff at post-tx: BAI

Table 27. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus behavioral weight loss (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis Approach	Binge-Eating Outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2011[69] Grilo et al., 2012[154] G1: **CBT-TL** (45/37/37) G2: **BWL-TL** (45/39/37) G3: **CBT-TL+BWL-TL** (35/30/25) ITT analysis Chi-square (categorical variables) ANOVAs (continuous variables) Mixed model repeated measures ANOVA ROC curves	Binge episodes/mo, mean (SD) Pre-tx: G1: 15.6 (8.0) G2: 14.9 (8.5) G3: 17.9 (9.4) Post-tx: G1: 2.2 (3.8) G2: 4.6 (11.0) G3: 3.4 (9.0) 6mo: G1: 2.7 (8.5) G2: 5.5 (7.6) G2: 3.2 (7.8) 12mo: G1: 2.4 (8.1) G2: 4.6 (6.0) G3: 4.0 (8.4) Diff at 6mo: G1 v G2 (p=0.009) Diff at 12mo: G1 v G2 (p=0.01) Nonstatistically sig diff at post-tx, 6mo, 12mo: Abstinence	Nonstatistically sig diff at post-tx, 6mo, 12mo: Weight concerns Shape concerns Eating concern Restraint Global score	BMI, mean (SD) Pre-tx: G1: 39.3 (6.1) G2: 38.0 (5.3) G3: 39.0 (6.1) Post-tx: G1: 38.5 (5.7) G2: 35.7 (5.9) G3: 38.9 (6.2) Diff at post-tx: G1 v G2 (p=0.03) Diff in change from pre- to post-tx: G1 v. G2: (p=0.04) Weight, mean (SD) Pre-tx: G1: 250.1 (52.6) G2: 242.7 (45.8) G3: 237.2 (42.8) Post-tx: G1: 248.5 (49.3) G2: 221.1 (43.4) G3: 230.4 (40.9) Diff in change from pre- to post-tx: G1 v G2 (p=0.02)	Nonstatistically sig diff at post-tx, 6mo, 12mo: BDI
Grilo et al., 2011[69] Grilo et al., 2012[154]	Abstinence (RR, NRR) Binge episodes/mo (G2 v G3)		Nonstatistically sig diff at post-tx, 6mo, 12mo: BMI (G2 v G3) Nonstatistically sig diff at 6mo, 12mo: BMI Nonstatistically sig diff from pre- to post-tx: Absolute weight loss BMI (G2 v G3) Nonstatistically sig diff in change from post-tx to 6mo, 12mo: Weight Absolute weight loss BMI (G1 v. G2; G2 v G3)	

Table 27. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus behavioral weight loss (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis Approach	Binge-Eating Outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[68] Masheb et al., 2007[146] G1: **CBTgsh** (37/37) G2: **BWLgsh** (38/38) G3: **Active control** (15/15) (Not included in this comparison) ITT sample ANCOVA Maximum likelihood mixed model	Binge episodes/mo (SR) Pre-tx: NR Post-tx: G1: 6.8 (6.1) G2: 7.3 (8.2) Diff at post-tx: (p=0.016) Non-rapid responders, EMM (SE) G1: 7.4 (1.3) G2: 11.3 (1.3) Diff at post-tx: (p=0.032) Binge episodes/mo (EDEQ) Pre-tx: G1: 12.1 (9.0) G2: 13.4 (12.1) Post-tx: G1: 2.8 (5.1) G2: 6.7 (8.0) Diff at post-tx: (p=0.015) Non-rapid responders, EMM (SE) G1: 6.0 (1.4) G2: 9.2 (1.3) Diff at post-tx: (p=0.013) Abstinence, % (Diary): Pre-tx: NR Post-tx: G1: 46% G2: 18.4% Diff at post-tx: (p=0.01)	TFEQ-Hunger, mean (SD) Pre-tx: G1: 9.8 (3.0) G2: 9.8 (3.0) Post-tx: G1: 6.6 (3.5) G2: 8.2 (3.7) Diff at post-tx: (p=0.025) TFEQ-Restraint, mean (SD) Pre-tx: G1: 9.1 (4.7) G2: 8.5 (3.5) Post-tx: G1: 10.8 (4.5) G2: 12.0 (4.7) Diff at post-tx: (p=0.047) Restraint (EDEQ) Rapid responders, EMM (SE) G1: 1.9 (0.2) G2: 2.8 (0.2) Diff at post-tx: (p=0.004) Nonstatistically sig diff at post-tx: Weight concern Shape concern Eating concern Disinhibition (TFEQ) Non-rapid responders: Restraint (TFEQ, EDEQ)	Nonstatistically sig diff at post-tx: BMI	Nonstatistically significant differences at post-tx: BDI RSE

Table 27. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus behavioral weight loss (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis Approach	Binge-Eating Outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[68] Masheb et al., 2007[146] (continued)	Abstinence, % (EDEQ): Pre-tx: NR Post-tx: G1: 59.5% G2: 23.7% Diff at post-tx: (p=0.002) Nonstatistiscally sig diff in change over time: Rapid responders: Binge episodes/mo (SR, EDEQ)			
Wilson et al., 2010[151] Sysko et al., 2010[156] G1: **BWL-TL** (64/64) G2: **CBTgsh** (66/66) G3: **IPT-TL** (75/75) (Not included in this comparison) ITT sample Repeated measures ANOVA LCA	Abstinence Post-tx: NR 24mo: NR Diff in change from post-tx to 24mo: (p<0.05) Probability of transitioning into the responder class (LTA analysis) Participants in G2: Class 3 vs Class 2: (p<0.05) Class 2 vs All classes G1: (p<0.05) Nonstatistically sig diff in change from pre- to post-tx: Abstinence Binge days/mo BED to subthreshold BED Nonstatistically sig diff in change from post-tx to 12mo: Abstinence Binge days/mo BED to subthreshold BED	Restraint, mean (SD) Pre-tx: NR Post-tx: NR Diff in change from pre- to post-tx: (p<0.01) Nonstatistically sig diff in change over time (post-tx): Weight concern Shape concern Eating concern Global score	BMI, mean (SD) Pre-tx: G1: 36.8 (SD 5.5) G2: 36.2 (SD 4.3) Post-tx: G1: 35.4 (SD 5.7) G2: 36.1 (SD 4.4) 12mo: G1: 36.0 (SD 6.2) G2: 35.7 (SD 4.9) Diff in change from pre- to post-tx: (p<0.005) Diff in change from post-tx to 12-mo: (p<0.05) 5% reduction in weight Pre-tx: NR Post-tx: G1: 41% G2: 15% Diff in change from pre- to post-tx: (p<0.001) Nonstatistically sig diff in change from post-tx to 24mo: Weight loss	Nonstatistically significant difference in change from pre- to post-tx: BDI RSE

ANCOVA = analysis of covariance; ANOVA = analysis of variance; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; BED = binge-eating disorder; BES = Binge Eating Scale; BMI = body mass index; BSI = Brief Symptom Inventory; BSQ = body shape questionnaire; BWLgsh = behavioral weight loss, guided self-help; BWL-TL = behavioral weight loss, therapist-led; CBT = cognitive behavioral therapy; CBTgsh = cognitive behavioral therapy, guided self-help; CBT-TL = cognitive behavioral therapy, therapist led; diff = difference; DSM = Diagnostic and Statistical Manual, Fourth Edition; EDE =

Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; EMM = estimated marginal mean; FLZ = Fragebogen zu Lebenszufriedenheit (life satisfaction); G = group; HDRS = Hamilton Depression Rating Scale; IPT-TL = interpersonal therapy, therapist-led; IDS-SR = Inventory of Depressive Symptoms – Self-Report; ITT = intent to treat; RCT = randomized controlled trial; LEARN = Lifestyle, Exercise, Attitude, Relationships, Nutrition; LTA = latent transition analysis; mo = months; N = number; NR = not reported; NRR = non-rapid response; OBE = objective binge episodes; ROC = receiver operating characteristic; RR = rapid response; RSE = Rosenberg Self-Esteem; SCL-90 = Symptom Checklist 90; SD = standard deviation; SBE = subjective binge episodes; sig = significant; SE = standard error; SR = self-report; STAI = State Trait Anxiety Inventory; SWE = allegemeine Selbstwirksamkeits-Skala (self-efficacy); TFEQ = Three Factor Eating Questionnaire; TR = Text Revision; tx = treatment; US = United States; wks = weeks

Binge-Eating Outcomes

In two therapist-led trials, CBT was better than BWL in reducing binge frequency at end of treatment. This benefit was sustained at three followup periods: 6 months,[69] 12 months,[69,150] and 6 years.[152] However, based on the intention-to-treat (ITT) samples, neither trial found significant benefit of CBT in the percentage of participants achieving abstinence at the end of treatment. Notably, the percentage of patients abstinent at the end of treatment was significantly *lower* in the CBT group (41 percent) than the BWL group (58 percent).[150] This difference in abstinence was no longer significant at either 12 months (52 percent versus 50 percent)[150] or 6 years.[152] Lastly, sequential therapist-led treatment (CBT followed by BWL), which more than doubled the duration of active treatment, was not more effective than either intervention alone in reducing binge frequency or affecting the percentage of participants achieving abstinence.[69]

Guided self-help was the subject of two trials. In one trial, CBT produced greater decreases in binge frequency and a higher percentage of participants achieving abstinence at the end of treatment than BWL.[68] In another guided self-help trial, CBT was not more effective than therapist-led BWL in reducing binge frequency or abstinence rates at the end of treatment; however, over a 2-year followup period, a higher percentage of CBT participants than BWL participants achieved abstinence.[151]

Using latent class analysis, Sysko and colleagues[156] identified four distinct groups of patients within their sample of 205 treatment-seeking overweight and obese individuals with DSM-IV BED: Class 1 (lower mean BMI and increased physical activity); Class 2 (the most binge eating, shape and weight concerns, compensatory behaviors, and negative affect); Class 3 (binge-eating frequencies similar to Class 2, with lower levels of exercise or compensation); and Class 4 (highest average BMI, the most overeating episodes, fewer binge episodes, and an absence of compensatory behaviors). Subsequently, the authors conducted a latent transition analysis to predict treatment response; the investigators defined these by a combined set of outcomes variables including objective binge episodes, subjective binge episodes, objective overeating episodes, BMI, weight concern, shape concern, restraint, and BDI score. The results indicated a higher probability of abstinence, for those in Class 2, among those receiving guided self-help CBT than among those receiving BWL regardless of class membership.

Eating-Related Psychopathology Outcomes

Neither of the trials comparing therapist led CBT and BWL nor the trial comparing therapist-led CBT and BWL with BWL alone demonstrated a significant difference between groups on eating-related psychopathology as measured by the EDE at the end of therapy,[69,150] short-term followup,[69,150] or long-term followup.[152] When the guided self-help CBT option was compared with both BWL options (guided self-help;[68] therapist-led[151]), the BWL self-help option led to significantly greater higher (worse) restraint scores at the end of care; the investigators found no difference in comparison with the therapist-led group. The research teams did not

report data on short- and long-term followup comparing the guided self-help CBT approach with either of the BWL options.

Weight Outcomes

For therapist-led approaches, BWL was better than CBT in reducing BMI at the end of care.[69,150] This difference between groups was not sustained at either 12 months[69,150] or 6 years,[152] largely because BMI continued to decrease after treatment ended among those who had received the CBT intervention. Sequential treatment (BWL after CBT) was not more effective than BWL alone in reducing either weight or BMI.[69]

At the end of care, therapist-led BWL was better than guided self-help CBT in reducing BMI and increasing the percentage of participants losing at least 5 percent of their total body weight.[151] However, over the 12-month follow-up period, mean BMI increased slightly in those randomized to the BWL group (+0.6) and decreased slightly in those assigned to the CBT group (−0.4); by 2-year followup, the difference in BMI between groups was no longer significant. Similarly, for a guided self-help approach, BWL was not better than CBT in reducing weight.[68]

General Psychological Outcomes

One trial measured treatment-related changes in anxiety; the results suggested that therapist-led CBT was more effective than therapist-led BWL in reducing symptoms of anxiety at 12-month followup.[150] In all four of the trials, the change in symptoms of depression did not differ between the CBT and BWL at either the end of therapy or at followup.[68,69,146,150-152]

Other Outcomes

The trials inconsistently reported on a variety of other outcomes, including life satisfaction and self-efficacy[150] and self-esteem.[68,151] No treatment-related differences were observed in any of these outcomes.

Behavioral Interventions: Cognitive Behavioral Therapy versus Interpersonal Therapy

Description of Studies

Interpersonal therapy (IPT) was originally developed for treating patients with depression.[158] Wilfley and colleagues later modified this intervention and formulated it for BED.[159] This manualized treatment is designed to be a brief, focused therapy that targets problem resolution and symptom improvement within four social domains: (1) grief, (2) interpersonal role disputes, (3) role transitions, and (4) interpersonal deficits. Treatment occurs in three phases: developing a thorough understanding of the interpersonal contexts that contributed to the BED and identifying interpersonal problem areas; helping the individual make interpersonal changes in the identified problems areas; and reviewing progress and helping to consolidate treatment gains to prevent relapse.

Psychodynamic IPT (PIPT) differs from the more traditional interpersonal therapy by focusing on present interactions among group members and with the therapist. PIPT uses cyclical relational patterns and circumplex models (versus social roles) to understand interpersonal pattern. It also applies a specific model (Malan's Triangle of Conflict[160]) to elucidate a patient's attachment needs, negative affect, and binge eating as a means of coping.

Three trials compared CBT with interpersonal therapies in treating patients with BED (Table 28).[75,140,151] Two trials compared therapist-led IPT with either therapist-led CBT[75] or guided self-help CBT.[151] Another trial compared therapist led CBT with therapist-led PIPT).[140]

Table 28. Characteristics of included intervention studies of cognitive behavioral therapy versus interpersonal therapies

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Tasca et al., 2006[140] Tasca et al, 2012[145] Canada Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G1: 48[a] G2: 47[a] G3: 40 (not included in this comparison) [a]Tasca et al., 2012[145] = G1 and G2 only 16 wks (6 mo) ≥ 18 years old Mean Age: 42.8 Mean BMI: 41.1 Female: 91% Nonwhite: 2% Current mood disorder: 62%	G1: **PIPT-TL**: manualized, 16, 90-min, weekly group sessions G2: **CBT-TL**: manualized, 16, 90-min, weekly group sessions G3: **Waitlist control** Co-interventions: none	Binge (EDE) • Days binged Weight • BMI Eating Related • TFEQ, 2 scales Psychological • CES-D total • IIP total • RSE total
Wilfley et al., 2002[75] Hilbert et al., 2012[161] US Outpatient primary care RCT Low	DSM-IV (SCID, EDE) G1: 81 G2: 81 20 wks (mean 46mo) 18-65 years old BMI = 27-48 Mean age: 45 Mean BMI: 37.4 Female: 83% Nonwhite: 93% Current mood disorder: 22% Current anxiety disorder: 13%	G1: **CBT-TL**: manualized, 20, 90-min weekly group sessions + 3 individual sessions at pre-treatment, mid-treatment, and post-treatment G2: **IPT-TL**: manualized, 20, 90-min weekly group sessions + 3 individual sessions at pre-treatment, mid-treatment, and post-treatment Co-interventions: none	Binge • Binge days (EDE) • Abstinence (EDE) • Remitted (EDE) Eating-related • EDE, 4 subscales • EDEQ, 4 subscales • Improved (EDE) Weight • BMI Psychological • GSI (total) • RSE (total) • SCL Depression • IIP (total) • SAS (total)
Wilson et al,, 2010[151] Sysko et al., 2010[156] US Outpatient RCT	DSM IV (Interview) G1: 64 (Not included in this comparison) G2: 66 G3: 75 24 wks (18 mo, 24 mo, 30 mo) >18 years old, BMI 27-45	G1: **BWL-TL**: 16 individual weekly sessions, then 4 sessions at 2-week intervals to encourage Self-monitoring of exercise, fat intake, and (if necessary) caloric intake; program based on NIDDK's Diabetes Prevention Program.	Binge • Number binge days in the past 28 days (EDE) Eating-related • EDE, global, 4 scores Psychological • BDI • RSE

Table 28. Characteristics of included intervention studies of cognitive behavioral therapy versus interpersonal therapies (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Wilson et al,, 2010[151] Sysko et al., 2010[156] (continued) Medium	Mean age: 48.4 Female: 82% Non-white: 18% Mean BMI: 36.4	G2: **CBTgsh**: 10 treatment sessions under guidance of therapist; first 4 sessions were weekly, next 2 at 2wk intervals, and last 4 at 4wk intervals. Based on Overcoming Binge Eating, focus of tx is developing a regular pattern of moderate eating using self-monitoring, self-control strategies, and problem-solving. G3: **IPT-TL**: 19 individual sessions delivered over 24 weeks (first 3 sessions during first 2 weeks, followed by 12 weekly sessions, and final 4 sessions at 2-week intervals). Treatment adapted for bulimia from one developed for depression and formulated for BED. Co-intervention: none	Weight • BMI • Weight (kg) • 5% reduction in body weight

BED = binge-eating disorder; BMI = body mass index; BWL-TL = behavioral weight loss, therapist-led; CBTgsh = cognitive behavioral therapy, guided self-help; CBT-TL = cognitive behavioral therapy, therapist led; CESD = Center for Epidemiologic Studies Depression Scale; DSM = Diagnostic and Statistical Manual, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; G = group; GSI = Global Severity Index; IIP = Inventory of Interpersonal Problems; IPT-TL = interpersonal therapy, therapist-led; kg = kilograms; mo = months; NIDDK = National Institute of Diabetes and Digestive and Kidney Diseases; PIPT-TL = psychodynamic interpersonal therapy, therapist-led; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem; SAS = Social Adjustment Scale; SCID/IP = Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Version; SCL-90 = Symptom Checklist 90; TFEQ = Three Factor Eating Questionnaire; US = United States; wks = weeks

Wilfley and colleagues recruited 162 participants, ages 18 to 65 with a BMI between 27 and 48.[75] More than 82 percent of the sample was female; approximately 7 percent were from an ethnic or racial minority. Participants were randomized to receive either therapist-led CBT or IPT. Participants were initially followed up every 4 months for 1 year and then subsequently at 4 years.[161]

The PIPT trial recruited 95 participants; virtually all were white (98 percent) and female (91 percent), with a mean age of 42.8 years and mean BMI of 41.1.[140] Both group CBT and PIPT were led by a therapist. Outcome assessments occurred at the end of therapy and at 6 months later.

Wilson and colleagues randomized 141 overweight or obese adults who met DSM-IV criteria for BED to either guided self-help CBT (n=66) or therapist-led IPT (n=75).[151] The vast majority of participants were while (79 percent) and female (84 percent). All participants were followed up at 6-month intervals for 2 years after the end of treatment.

Key Points

Three RCTs assessed CBT compared with interpersonal therapies. Trials differed in the intervention types that were compared. Consequently, the evidence did not allow for synthesis across studies (evidence was insufficient for all outcomes) (Table 29).

Table 29. Strength of evidence for outcomes of interventions for cognitive behavioral therapy versus interpersonal therapies

Treatment Comparison	Binge Eating	Eating-related psychopathology	Weight	Psychological Outcomes
Therapist-led CBT vs. PIPT	**Insufficient** 1 RCT (N=95) No difference Binge frequency **Insufficient** 1 RCT (N=95) IPT better Abstinence (long-term followup)	**Insufficient** 1 RCT (N=95) No difference	**Insufficient** 1 RCT (N=95) No difference	**Insufficient** 1 RCT (N=95) No difference
Therapist-led CBT vs. IPT	**Insufficient** 1 RCT (N=162) No difference	**Insufficient** 1 RCT (N=162) CBT better at post-tx and short-term followup (1 subscale) IPT better at long-term followup (5 subscales)	**Insufficient** 1 RCT (N=162) No difference	**Insufficient** 1 RCT (N=162) No difference
Guided self-help CBT vs therapist-led IPT	**Insufficient** 1 RCT (N=141) No difference	**Insufficient** 1 RCT (N=141) No difference	**Insufficient** 1 RCT (N=141) No difference	**Insufficient** 1 RCT (N=141) No difference

[a] Unless otherwise noted, reflects binge frequency and abstinence outcomes; [b] Unless otherwise noted, reflects weight and BMI outcomes

CBT = cognitive behavioral therapy; IPT = interpersonal therapy; PIPT = psychodynamic interpersonal therapy, RCT = randomized controlled trial; tx = treatment; vs = versus

- Binge -eating frequency and abstinence outcomes did not significantly differ at the end of treatment in any trials. Compared with CBT, IPT was associated with better abstinence in one trial at 46 months.
- For eating-related psychopathology outcomes, one trial found significant differences between therapist-led IPT and CBT. Although CBT was superior at both the end of care and short-term followup, IPT was superior at long-term followup.
- Weight and depression outcomes did not significantly differ at any endpoints.

Detailed Synthesis

All three trials reported on binge frequency and abstinence, eating-related psychopathology, weight, and depression (Table 30) One of these trials also reported results of a latent class analysis and subsequent latent transition analysis designed to identify common patient characteristics that predict better treatment outcome in those assigned to the guided self-help CBT group and those assigned to IPT.[156]

Table 30. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus interpersonal therapies

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Tasca et al., 2006[140] Tasca et al., 2012[145] G1: **PIPT-TL** (48/37/35/37) G2: **CBT-TL** (47/37/32/37) G3: **Waitlist** (40/33) (not included in this comparison) ITT sample Hierarchical linear model with restricted maximum likelihood method of estimation	Nonstatistically sig diff in change from pre-tx to post-tx and pre-tx to 12mo: Binge Nonstatistically sig diff at post-tx, 6mo, 12mo: Abstinence Improved (< 2 binge days/wk)	Nonstatistically sig diff in change from pre-tx to post-tx and pre-tx to 6mo: TFEQ-Restraint TFEQ-Hunger	Nonstatistically sig diff in change from pre-tx to post-tx and pre-tx to 12mo: BMI	RSE, mean (SD) Pre-tx G1: 25.14 (5.72) G2: 24.66 (6.40) Post-tx G1: 25.72 (2.27) G2: 26.17 (2.64) 6mo G1: 31.39 (3.61) G2: 23.76 (3.46) Diff in change from pre-tx to post-tx: (p=.006) Diff in change from pre-tx to 6mo: (p<0.001) IIP cold/distant, mean (SD): Pre-tx: G1: 9.22 (5.71) G2: 9.46 (5.19) Post-tx G1: 7.17 (5.20) G2: 8.31 (6.22) 6-month G1: 5.84 (4.98) G2: 9.11 (5.83) Diff in rate of change from pre-tx to 6mo: (p=0.038) Nonstatistically sig diff in change from pre-tx to post-tx and pre-tx to 6mo: CESD IIP total Nonstatistically sig diff in rate of change from pre-tx to 6mo: IIP domineering/controlling; IIP vindictive/self-centered; IIP socially inhibited; IIP nonassertive; IIP overly accommodating; IIP self-sacrificing; IIP intrusive/needy

Table 30. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus interpersonal therapies (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Wilfley et al., 2002[75] Hilbert et al., 2012[161] G1: **CBT-TL** (81/78/67/65) G2: **IPT-TL** (81/80/71/68) ITT sample Generalized estimating equations (categorical) Hierarchical linear modeling (continuous)	Abstinence, % Post-tx: G1: 36 (81.8%) G2: 29 (64.4%) 12mo: G1: 28 (77.8%) G2: 22 (53.7%) 46mo: G1: 13 (52.0%) G2: 23 (76.7%) Diff in change over time (post-tx to 46mo, 12mo to 46mo): (p<0.001) Nonstatistically sig diff between groups (post-tx to 12mo): Abstinence Binge days/mo Remitted (<4 OBEs/mo) Nonstatistically sig diff between groups (post-tx up to 46mo): Binge days/mo Remitted (<4 OBEs/mo)	Restraint (EDE), mean (SD) Pre-tx: G1: 1.8 (1.2) G2: 2.1 (1.3) Post-tx: G1: 0.9 (0.9) G2: 1.5 (1.1) 4mo: G1: 0.9 (0.9) G2: 1.3 (1.2) Diff in change over time (post-tx): (p<0.001) Diff in change over time (post-tx to 4mo): (p=.04) EDE-Q Eating Concern, mean (SE) Pre-tx: G1: 3.63 (0.15) G2: 3.55 (0.15) Post-tx: G1: 1.05 (0.16) G2: 1.85 (0.15) 12mo: G1: 0.92 (0.18) G2: 1.50 (0.17) 46mo: G1: 1.57 (0.21) G2: 1.19 (0.19) Diff in change over time (12mo to 46mo): (p<0.01) Diff in change over time (post-tx to 46mo): (p<0.01)	Nonstatistically significant differences between groups (up to 46mo): BMI	Nonstatistically significant differences between groups (up to 12mo): GSI total RSE total SCL Depression SAS total IIP total Nonstatistically sig diff between groups (46mo): BSI-Anxiety BSI-Depression

Table 30. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus interpersonal therapies (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-Eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Wilfley et al., 2002[75] Hilbert et al., 2012[161] (continued)		EDE-Q Shape Concern, mean (SE) Pre-tx: G1: 4.85 (0.18) G2: 4.79 (0.18) Post-tx: G1: 3.19 (0.19) G2: 3.72 (0.19) 12mo: G1: 2.92 (0.21) G2: 3.12 (0.20) 46mo: G1: 3.25 (0.25) G2: 2.82 (0.23) Diff in change over time (post-tx to 46mo): (p<0.01) EDE-Q Global Diff in change over time (post-tx to 46mo): (p<0.01) Pre-tx: G1: 3.76 (0.14) G2: 3.80 (0.14) Post-tx: G1: 2.14 (0.14) G2: 2.72 (0.14) 12mo: G1: 1.88 (0.16) G2: 2.32 (0.15) 46mo: G1: 2.41 (0.19) G2: 2.12 (0.17) Diff in change over time (post-tx to 46mo): (p<0.01) EDE-Weight/Shape Concern Pre-tx: G1: 4.92 (0.28) G2: 4.65 (0.25) Post-tx: G1: 2.90 (0.28) G2: 3.40 (0.25) 12mo: G1: 2.78 (0.28) G2: 3.27 (0.25)		

Table 30. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus interpersonal therapies (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Wilfley et al., 2002[75] Hilbert et al., 2012[161] (continued)		46mo: G1: 3.80 (0.28) G2: 3.26 (0.25) Diff in change over time (12mo to 46mo): (p<0.01) Nonstatistically sig diff between groups (post-tx to 8mo, 12mo): Restraint (EDE) Nonstatistically sig diff between groups (post-tx to 12mo): Eating concern (EDE) Weight concern (EDE) Shape concern (EDE) Global concern (EDE) Nonstatistically sig diff between groups (up to 46mo): Weight Concern (EDEQ) Restraint (EDEQ) Improved (≤ normative EDE global score)		
Wilson et al., 2010[151] Sysko et al., 2010[156] G1: **BWL-TL** (64/64) (not included in this comparison) G2: **CBTgsh** (66/66) G3: **IPT-TL** (75/75) ITT sample Repeated measures ANOVA LCA LTA	Abstinence at post-tx in "high severity" (> 14 binge days/mo at baseline): G2: 50% G3: 66% G2< G3 (sig diff, p=NR) Probability of transitioning into the responder class (LTA analysis) G2: Class 2 < all others (p<0.05) G3: Class 3 < all others (p<0.05) Class 2: G3 (0.81) > G2 (0.59) (sig diff, p=NR)	Nonstatistically significant difference in change over time (pre-tx to post-tx): Weight concern Shape concern Eating concern Global score	Nonstatistically significant difference in change over time (pre-tx to post-tx): BMI	Nonstatistically significant difference in change over time (pre-tx to post-tx): BDI RSE

Table 30. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy versus interpersonal therapies (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Analysis approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Wilson et al., 2010[151]	Class 3: G2 (0.74) > G3 (0.61) (sig diff, p = NR)			
Sysko et al., 2010[156] (continued)	Nonstatistically sig diff in change over time (pre-tx to post-tx; post-tx to 12mo, 24mo): Binge days/mo Abstinence BED to subthreshold BED			

BED = binge-eating disorder; BMI = body mass index; BWL-TL = behavioral weight loss, therapist-led; CBTgsh = cognitive behavioral therapy, guided self-help; CBT-TL = cognitive behavioral therapy, therapist led; CESD = Center for Epidemiologic Studies Depression Scale; diff = difference; DSM = Diagnostic and Statistical Manual, Fourth Edition; EDE = Eating Disorder Examination Inventory; EDEQ = Eating Disorder Examination Questionnaire; G = group; GSI = Global Severity Index; IIP = Inventory of Interpersonal Problems; IPT-TL = interpersonal therapy, therapist-led; ITT = intent to treat; kg = kilograms; LCA = latent class analysis; LTA = latent transition analysis; mo = months; NR = not reported; PIPT-TL = psychodynamic interpersonal therapy, therapist-led; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem; SAS = Social Adjustment Scale; SCID/IP = Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Version; SCL-90 = Symptom Checklist 90; SD = standard deviation; sig = significant; TFEQ = Three Factor Eating Questionnaire; tx = treatment; wks = weeks

Binge-Eating Outcomes

Binge frequency and abstinence outcomes did not differ between treatment groups at the end of treatment in the three trials.[75,140] Measured again at short-term followup, binge frequency and abstinence continued not to differ between CBT and PIPT.[140] Similarly, at 30-month followup, binge-eating outcomes did not differ between guided self-help CBT and therapist-led IPT.[151]

In contrast, in the trial comparing therapist-led CBT and IPT, over a longer, 46-month course of followup, the trajectory of abstinence differed between patients receiving CBT and those receiving IPT. In the CBT group, the percentage of the group that was abstinent was initially high (81 percent) at the end of treatment but dropped over time (52 percent); in the IPT arm, the percentage of abstinent patients was initially more modest (64 percent) at trial end but increased over time (77 percent); thus, the change over time was considered significantly better in the IPT group than the CBT group.[75]

The trial comparing therapist-led IPT and guided self-help CBT conducted secondary analyses to examine treatment outcome moderators[151] and predictors (also presented in the CBT versus BWL section of this chapter).[156] First, comparisons of just this subgroup of patients found that among those with high baseline binge severity (i.e., binge days > 14 in the past 28 days), those randomized to IPT fared better than those randomized to CBT (66 percent versus 50 percent, respectively). Second, based on a latent class analysis results (presented in the CBT versus BWL section of this chapter), the authors conducted a subsequent latent transition analysis to predict treatment response (defined by a combined set of outcomes including OBEs, SBEs, OOEs, BMI, weight concern, shape concern, restraint, and BDI score). The results

indicated differential response to treatment between classes such that there was a greater percentage of patients abstinent among those receiving IPT in Class 3 than all participants receiving CBTgsh regardless of class membership.

Eating-Related Psychopathology Outcomes

Across all assessment time points, eating-related outcomes did not differ significantly between therapist-led CBT and PIPT[140] or between guided self-help and therapist-led IPT.[151] By comparison, participants randomized to therapist-led CBT demonstrated better outcomes on dietary restraint than those receiving IPT at the end of care (mean, 0.9 versus 1.5, respectively) and through 4-month followup (mean, 0.9 versus 1.3, respectively); those differences did not persist, however over the longer course of followup (i.e., 12-month through 46-month followup).[75] Similarly, compared with patients receiving therapist-led IPT, those receiving therapist-led CBT tended initially to show larger reductions in eating, shape, and weight concerns through 12-month followup, but by 46-month followup this pattern was reversed.

Weight Outcomes

BMI outcome did not differ between treatment groups at end of treatment or followup in any of these trials.[75,140,151]

General Psychological Outcomes

Symptoms of depression did not differ significantly between treatment group at end of treatment or followup in any of these trials.[75,140,151]

Other Outcomes

In two trials, neither therapist-led PIPT[140] nor IPT[75] was better than CBT in reducing interpersonal problems. Similarly, at the end of treatment and through followup, IPT was no better than either therapist-led or guided self-help CBT[75,151] in improving self-esteem. In contrast, self-esteem was significantly higher at the end of treatment and 6-month followup for patients randomized to the PIPT group than for those in the CBT group.[140]

Behavioral Interventions: Cognitive Behavioral Therapy Combined with Diet or Weight Loss Interventions

Description of Studies

Three trials examined the use of CBT plus additional interventions involving either diet or weight loss strategies (or both) in treating patients with BED (Table 31). Two trials compared CBT alone with CBT plus a diet or weight loss intervention,[69,162] and one trial compared CBT plus a low energy dense diet with CBT plus general nutritional counseling. All trials included participants diagnosed with BED based on DSM-IV criteria. We rated one trial as low risk of bias and two as medium risk of bias. The trials were too heterogeneous in interventions (especially comparators and combination interventions) to do meta-analysis, so all results reflect qualitative synthesis only.

Table 31. Characteristics of included intervention studies of CBT plus diet and/or weight loss interventions

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Masheb et al., 2011[70] United States Outpatient RCT Low	DSM IV-TR (SCID/IP, EDE) G1: 25 G2: 25 6mo (6mo) Age 21-60 BMI ≥ 30 Available for length of treatment and follow-up at 12 months Mean age= 45.8 Females= 76% Nonwhite= 20% Mean BMI= 39.1	G1: CBT-TL+Low energy dense diet, phase 1: patients informed of objective and science of energy density; phase 2: goals set to increase patient's consumption of low-energy-density foods. Clinicians reviewed and discussed weekly topics with patients and problem-solved any obstacles to achieving goals for lowering energy density. G2: CBT-TL+General nutrition counseling, phase 1: patients were informed about objective of general nutrition treatment and science and definition of nutrients and calories; phase 2: weekly topics were designed specifically as a control for the type and amount of dietary information provided in the energy density condition. Clinicians reviewed and discussed weekly topics with patients, but no problem-solving or goal-setting was conducted. Co-interventions: None	Binge • Frequency of OBE episodes • EDE in past 28 days • Binge remission (0 binges for 28 days prior to the end of treatment) per EDE • Binge remission (0 binges for the 28 days prior to the end of treatment) per prospective self-monitoring Eating-related • EDE, global, 4 scores • TFEQ, 3 scores Psychological • BDI Weight • BMI • % of all participants who received at least 5% of weight loss • Mean % weight loss
De Zwaan et al., 2005[162] United States Outpatient RCT Medium	DSM-IV (SCID/IP) G1: 36 G2: 35 24 weeks (12 mo) Women aged 18-55 ≥50 lbs. above "ideal" body weight Mean age: 39.3 Female: 100% Nonwhite: 2.8% Mean weight: 216.1 Mean BMI: 36.1	G1: CBT-TL+VLCD, protein-sparing modified fast involving 1) consumption of powdered supplement mixed with noncaloric liquids and abstaining from regular food and caloric beverages, 2) weekly group behavioral training meetings with dietitian (included nutritional education, behavioral strategies for weight reduction not designed to reduce or prevent binge eating, and low-level exercise program), 3) reintroduction of food, and then 4) weight stabilization phase involving balanced deficit diet of 1,200 kcal/day plus highly structured	Binge • Prevalence of BED diagnosis • % patients abstinent from binges in previous 7 days • % of weeks abstinent from binge eating • Frequency of binge-eating episodes in previous 7 days Eating-related • EDI • TFEQ • BES Psychological • BDI • HAM-D • RSE

Table 31. Characteristics of included intervention studies of CBT plus diet and/or weight loss interventions (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
De Zwaan et al., 2005[162] (continued)		and manual-based; plus 10 weekly CBT sessions lasting 1.5 hours each. The groups each contained 6-15 participants; placed special emphasis on relapse prevention; included psychoeducation about BED and binge eating, homework assignments, cognitive restructuring, and behavioral problem solving lasting G2: VLCD, protein-sparing modified fast involving 1) consumption of powdered supplement mixed with noncaloric liquids and abstaining from regular food and caloric beverages, 2) weekly group behavioral training (BT) meetings with dietitian (included nutritional education, behavioral strategies for weight reduction not designed to reduce or prevent binge eating, and low-level exercise program), 3) reintroduction of food, and then 4) weight stabilization phase involving balanced deficit diet of 1,200 kcal/day Co-interventions: none	Weight • Weight in pounds • % of initial weight lost following VCLD • Number of patients who lost ≥10% of initial body weight • Early substantial weight regain • BMI
Grilo et al., 2011[69] Grilo et al., 2012[154] United States Outpatient primary care RCT Medium	DSM-IV (SCID-I/P, EDE) G1: 45 G2: 45 (see section on CBT vs. BWL for outcomes of this arm) G3: 35 24 wks (6, 12 mo) 18-60 years old BMI range = 30-55	G1: CBT-TL: manualized group CBT, 16, 60-min sessions, over 24 weeks G2: BWL-TL: manualized group BWL (LEARN Manual), 16, 60-min sessions, over 24 weeks G3: CBT-TL+BWL-TL: manualized group CBT (16, 60-min sessions over 16 weeks) followed by manualized group BWL (16, 60-min sessions over 24 weeks)	Binge • Binge episodes/mo (EDE) • Remission Eating-related • EDE, 4 subscales and global score Weight • BMI • Weight (pounds) • Weight loss (pounds) Psychological • BDI

Table 31. Characteristics of included intervention studies of CBT plus diet and/or weight loss interventions (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Grilo et al., 2011[69] Grilo et al., 2012[154] (continued)	Mean age: 44.8 Mean BMI: 38.8 Female: 67% Nonwhite: 23% Lifetime major depressive disorder: 43.20%	Co-interventions: none	

BDI = Beck Depression Inventory; BED = binge-eating disorder; BMI = body mass index; BWL = behavioral weight loss; CBT = cognitive behavioral therapy; EDE = Eating Disorders Examination; G = group; HAM-D = Hamilton Depression Rating Scale; IV = fourth edition; kcal = kilocalories; min = minute(s); mo = month; OBE = objective binge episode; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem scale; SCID/IP = Structured Clinical Interview for DSM Axis I Disorders, Patient version; TFEQ = Three Factor Eating Questionnaire; TL = therapist-led; TR = text revision; SCID = Structured Clinical Interview for DSM Disorders; VLCD = very low calorie diet; wk = weeks

One trial recruited 50 obese participants (76 percent female, 80 percent white) between the ages of 21 and 60.[70] Participants were randomized to 21 sessions of therapist-led CBT for BED plus the diet intervention or the CBT intervention plus general nutritional counseling. The diet component focused on the benefits of a low energy dense diet and planning meals, identifying obstacles, and maintaining weight. The nutritional counseling focused on general nutritional advice for health (versus focusing on the diet approach per se). Outcomes were measured at the end of treatment and 6 months later.

In the other trial in this category, 71 women (98 percent white, ages 22 to 55, mean BMI of 36.1 kg/m^2) were randomized to 24 weeks of either therapist-led CBT plus a very low calorie diet group or a group receiving only the diet.[162] The diet consisted of 800 kcal/day via powdered nutritional supplement for 12 weeks followed by a 6-week period of reintroducing solid foods, and then a 6-week stabilization period, eating a balanced 1200 kcal/day diet. Weekly, all participants received a physical checkup and 90-minute group sessions with the dietician for nutritional education, behavioral strategies for weight reduction, and a walking exercise program. Of note, this study took a unique approach to recruitment and retention, requiring all participants to cover the cost of the diet ($1,000) and pay a $50 deposit (which was later returned to study completers). Followup was at the end of treatment and at 1-, 6-, and 12-month followup.

The third trial randomized 80 obese adults (67 percent female, 76 percent white, mean age of 45 years) to therapist-led CBT or the CBT approach plus therapist-led behavioral weight loss (BWL).[69] CBT participants received a widely used manual;[133] treatment consisted of 16, 60-minute groups sessions over a period of 24 weeks. The BWL intervention was based on the LEARN program.[155] LEARN focuses on making lifestyle changes along with moderate caloric restriction and increased physical activity to promote weight loss. Outcomes were measured at the close of treatment and at 6- and 12-month followup.

Key Points

- Treatment comparisons differed in three small RCTs examining whether dietary interventions promoted better outcomes when added to therapist-led CBT than various interventions alone. No significant differences were found for any treatment comparisons (strength of evidence insufficient for all outcomes) (Table 32).

Table 32. Strength of evidence for outcomes for therapist-led cognitive behavioral therapy plus diet and/or weight loss interventions

Treatment Comparison	Binge-Eating	Eating-Related Psychopathology	Weight	Depression
CBT plus LED vs. CBT plus GNC	Insufficient 1 RCT (N=50) No difference	Insufficient 1 RCT (N=50) No difference	Insufficient 1 RCT (N=50) No difference	Insufficient 1 RCT (N=50) No difference
CBT plus VLCG vs. VLCB alone	Insufficient 1 RCT (N=71) No difference	Insufficient 1 RCT (N=71) CBT+VLCD better (3 subscales)	Insufficient 1 RCT (N=71) No difference	Insufficient 1 RCT (N=71) No difference
CBT vs. CBT plus therapist-led BWL	Insufficient 1 RCT (N=71) No difference	Insufficient 1 RCT (N=71) No difference	Insufficient 1 RCT (N=71) CBT-TL+BWL-TL better	Insufficient 1 RCT (N=71) No difference

[a] Unless otherwise noted, reflects binge frequency and abstinence outcomes.

[b] Unless otherwise noted, reflects weight and BMI outcomes.

GNC = general nutritional counseling LED = low energy dense diet; VLCD = very low calorie diet

Detailed Synthesis

All three trials reported on binge frequency, abstinence, eating-related psychopathology, BMI, and depression outcomes.[69,70,162] Table 33 provides details on the results of these trials.

Table 33. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy plus diet and/or weight loss interventions

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Masheb et al., 2011[70] G1: **CBT-TL+LED** (25/20) G2: **CBT-TL+GNC** (25/23) Not reported Chi-square Mixed effects models Least square mean comparisons	Nonstatistically sig diffs in change over time (post-tx): Abstinence (Diary, EDE) Nonstatistically sig diffs in change over time (6mo): Binge episodes/mo	Nonstatistically sig diffs in change over time (6mo): TFEQ-Disinhibition TFEQ-Restraint TFEQ-Hunger Weight concern Shape concern Eating concern Global score (EDE)	Nonstatistically sig diffs in change over time: (post-tx, 6mo): 5% weight loss Absolute weight loss BMI	Nonstatistically sig diffs in change over time (6mo): BDI Nonstatistically sig diff in change over time (post-tx, 6mo): Total cholesterol HDL LSL Triglycerides Waist circumference Systolic BP Diastolic BP

Table 33. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy plus diet and/or weight loss interventions (continued)

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
de Zwaan et al., 2005[162] G1: **CBT-TL+VLCD** (36/36/30/28/31) G2: **VLCD** (35/35/25/32/31) ITT sample Random regression ANCOVA	Nonstatistically sig diff in change over time (post-tx) Binge episodes (EB-IV) Abstinence Nonstatistically sig diff in change over time (12mo): Threshold BED Abstinence	TFEQ-Hunger Pre-tx: NR 12mo: NR Diff in change over time (12mo): (p=0.04) EDI-Drive for thinness Pre-tx: NR 12mo: NR Diff in change over time (12mo): (p=0.04) EDI-Bulimia Pre-tx: NR 6mo: NR Diff in change over time (6mo): (p=0.02) Nonstatistically sig diff in change over time (post-tx, 6mo, 12mo): TFEQ-Disinhibition TFEQ-Restraint BES EDI-Body dissatisfaction EDI-Ineffectiveness EDI-Perfectionism EDI-Interpersonal distrust EDI-Interoceptive awareness EDI-Maturity fears	Nonstatistically sig diff at post-tx Absolute weight loss BMI Nonstatistically sig diff in change over time (6mo, 12mo): BMI Absolute weight loss 5% weight loss Weight regain (at 6mo)	Nonstatistically sig diff in change over time (post-tx, 6mo, 12mo): HAMD RSE MPQ-Control/Impulsivity BDI

Table 33. Binge-eating disorder treatment results: Outcomes of trials of cognitive behavioral therapy plus diet and/or weight loss interventions (continued)

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2011[69] G1: **CBT-TL** (45/37/37) G2: **BWL-TL** (45/39/37) (Not included in this comparison) G3: **CBT-TL+BWL-TL** (35/30/25) ITT analysis Chi-sqaure (categorical variables) ANOVAs (continuous variables) Mixed model repeated measures ANOVA ROC curves	Nonstatistically sig diff at post-tx, 6mo, 12mo: Binge episodes Abstinence	Nonstatistically sig diff in change over time (post-tx, 6, 12mo): Weight concerns Shape concerns Eating concern Restraint Global score	BMI, mean (SD) Pre-tx: G1: 39.3 (6.1) G3: 39.0 (6.1) Post-tx: G1: 38.5 (5.7) G3: 38.9 (6.2) Diff at post-tx: G1 v. G3 (p=0.04) Nonstatistically sig diff at 6, 12mo: BMI Nonstatisically sig diffs in change over time (post-tx, 6mo, 12mo) Weight Absolute weight loss	Nonstatistically sig diff in change over time (post-tx, 6, 12mo): BDI

ANCOVA = analysis of covariance; ANOVA = analysis of variance; BDI = Beck Depression Inventory; BED = binge-eating disorder; BMI = body mass index; BWL = behavioral weight loss; CBT = cognitive behavioral therapy; diff = difference; EDE = Eating Disorders Examination; G = group; HAM-D = Hamilton Depression Rating Scale; ITT = intent to treat; kcal = kilocalories; min = minute(s); mo = month; NR = not reported; OBE = objective binge episode; RCT = randomized controlled trial; ROC = receiver operating characteristic; RSE = Rosenberg Self-Esteem scale; SD = standard deviation; sig = significant; TFEQ = Three Factor Eating Questionnaire; TL = therapist-led; VLCD = very low calorie diet; wk = weeks

Binge-Eating Outcomes

None of these trials found a significant difference in abstinence or binge frequency at either the end of treatment or at the various followup points.[69,70,162]

Eating-Related Psychopathology Outcomes

With the exception of three subscales in one trial, treatment groups did not differ in eating-related psychological measures at the end of treatment or at followup. At 12-month followup, more favorable changes occurred in the TFEQ susceptibility for hunger subscale and in the EDI Drive for Thinness and Bulimia subscales in the group assigned to the CBT plus diet group than in the CBT group alone.[162]

Weight Outcomes

Adding BWL to CBT promoted weight loss measured at the end of treatment compared with CBT alone, but these benefits did not persist over time.[69] Moreover, the magnitude of the difference at each endpoint had minimal clinical significance: ≤1 BMI point difference between groups at the end of the treatment.

General Psychological and Other Outcomes

In all three trials, combining CBT with a weight loss intervention was not more effective than CBT alone in reducing symptoms of depression.[69,70,162] In one trial, neither self-esteem nor impulsivity improved to a greater extent with combination treatment than with the single intervention.[162]

Behavioral Interventions: Behavioral Weight Loss

Description of Studies

Two trials, both rated medium risk of bias, examined BWL interventions for BED. These compared guided self-help BWL with an active control[68] and therapist-led BWL with interpersonal therapy (IPT).[151] Details of these trials are presented in Table 34.

Table 34. Characteristics of trials of behavioral weight loss versus active control or interpersonal therapy

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major benefit outcome Measures Subgroup Analyses and Comparisons (if any)
Grilo et al., 2005[68] Masheb et al., 2007[146a] United States Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G2: 38 G3: 15 8 wks (4 wks) 18-60 years old BMI ≥ 27 Mean age: 46.3 Mean BMI: 35.5 Female: 79% Any Axis I psychiatric disorder: 68.91%	G2: BWLgsh: BWL self-help manual (LEARN) + 6, 15-20min, bi-weekly clinician sessions over 12 weeks G3: Active Control: 6, 15-20 min, bi-weekly clinician sessions over 12 weeks; focused on completion of self-monitoring Cointerventions: Participants in all groups completed daily self-monitoring record forms about their overeating behaviors. Participants in all groups also met briefly (15-20 minutes) with doctoral research-clinicians 6 times (biweekly during the 12-week intervention period), although the focus of the meetings was different in each arm.	Binge • Binge episodes/mo (Diary, EDEQ) • Abstinence (Diary, EDEQ) Eating-related • EDEQ, 4 subscales • TFEQ-Hunger • TFEQ-Restraint • TFEQ-Disinhibition Weight • BMI Psychological • BDI • RSE

Table 34. Characteristics of trials of behavioral weight loss versus active control or interpersonal therapy (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major benefit outcome Measures Subgroup Analyses and Comparisons (if any)
Wilson et al,, 2010[151] Sysko et al., 2010[156] [b] United States Outpatient RCT Medium	DSM IV (Interview) G1: 64 G2: 66 (not included in this comparison) G3: 75 24 wks (18 mo, 24 mo, 30 mo) >18 years old, BMI 27-45 Mean age: 48.4 Female: 85% Non-white: 18% Mean BMI: 36.4	G1: BWL-TL: 16 individual weekly sessions, then 4 sessions at 2-week intervals to encourage Self-monitoring of exercise, fat intake, and (if necessary) caloric intake; program based on NIDDK's Diabetes Prevention Program. G2: CBTgsh: 10 treatment sessions under guidance of therapist; first 4 sessions were weekly, next 2 at 2wk intervals, and last 4 at 4wk intervals. Based on Overcoming Binge Eating, focus of tx is developing a regular pattern of moderate eating using self-monitoring, self-control strategies, and problem-solving. G3: IPT-TL: 19 individual sessions delivered over 24 weeks (first 3 sessions during first 2 weeks, followed by 12 weekly sessions, and final 4 sessions at 2-week intervals). Treatment adapted for bulimia from one developed for depression and formulated for BED. Co-intervention: none	Binge • Number binge days in the past 28 days (EDE) Eating-related • EDE, global, 4 scores Psychological • BDI • RSE Weight • BMI • Weight (kg) • 5% reduction in body weight

[a] Examined rapid response in G1 and G2 only

[b] Conducted a latent class analysis and latent transition analysis

BED = binge-eating disorder; BDI = Beck Depression Inventory; BMI = body mass indez; BWLgsh = behavioral weight loss, guided self-help; BWL-TL = behavioral weight loss, therapist-led; CBTgsh = cognitive behavioral therapy, guided self-help; EDE = Eating Disorders Examination; EDEQ = Eating Disorders Examination Questionnaire; G = group; IPT-TL = interpersonal therapy, therapist-led; kg = kilogram; mo = months; NIDDK = National Institute of Diabetes and Digestive and Kidney Diseases; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem; SCID/IP = Structured Clinical Interview for DSM Axis I Disorders, Patient Version; TFEQ = Three Factor Eating Questionnaire; tx = treatment; US = United States; wks = weeks; v = versus

Fifty-three overweight or obese adults (ages 18 to 60, 76 percent female, 70 percent white) with a DSM-IV BED diagnosis were randomized to guided self-help BWL group or an active control group.[68] BWL involved the LEARN Program[155] delivered in six bi-weekly sessions. In the active control group, participants completed self-monitoring records and met biweekly for brief sessions with a therapist, but they did not receive any intervention or manual.

The interpersonal therapy (IPT) trial randomized overweight or obese adults (ages 18 to 77, 87 percent female, 82 percent white) who met DSM-IV criteria for BED to therapist-led BWL or IPT groups.[151] In this study, BWL was based on the Diabetes Prevention Program's Manual[157] (described earlier). Participants assigned to the IPT group received 19 sessions of group IPT over 24 weeks. Outcomes were assessed at the end of treatment and at 6-month intervals for 2 years after the end of treatment.

Key Points

- The strength of evidence is insufficient to determine the efficacy of behavioral weight loss (two different approaches) compared with either active control or IPT. These strategies were compared in single, small sample trials (Table 35).

Table 35. Strength of evidence for outcomes of behavioral weight loss treatment versus active control and interpersonal therapy

Treatment Comparison	Binge-Eating	Eating-related Psychopathology	Weight	Depression
Guided self-help BWL v. active control	Insufficient 1 RCT (N=53) No difference	Insufficient 1 RCT (N=53) BWLgsh better	Insufficient 1 RCT (N=53) No difference	Insufficient 1 RCT (N=53) No difference
Therapist-led BWL v interpersonal therapy	Insufficient 1 RCT (N=139) IPT better abstinence, 24 mo	Insufficient 1 RCT (N=139) No difference	Insufficient 1 RCT (N=139) BWL better post-tx	Insufficient 1 RCT (N=139) No difference

RCT = randomized controlled trial; mo = months; tx = treatment; v = versus gsh = suided self-help; BWL = behavioral weight loss

Detailed Synthesis

Both trials reported on binge frequency and abstinence, eating-related psychopathology, BMI, and depression outcomes at the end of treatment; one followed patients for an additional 2 years.[151] Table 36 provides details about the outcomes of these two trials.

Table 36. Binge-eating disorder treatment results: Outcomes of included trials comparing behavioral weight loss with an active comparator

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis approach	Binge-eating outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[68] Masheb et al., 2007[146]* G2: **BWLgsh** (38/38) G3: **Active Control** (15/15) ITT sample ANCOVA Maximum likelihood mixed model	Nonstatistically sig diff at post-tx: Binge episodes/mo (Diary; EDEQ) Abstinence (Diary, EDEQ):	TFEQ-Hunger, mean (SD) Pre-tx: G2: 9.8 (3.0) G3: 9.3 (3.5) Post-tx: G2: 8.2 (3.7) G3: 9.7 (3.0) Diff at post-tx (p=0.046) TFEQ-Restraint, mean (SD) Pre-tx: G2: 8.5 (3.5) G3: 7.3 (3.6)	Nonstatistically sig diff in change over time BMI	Nonstatistically sig diff in change over time BDI RSE

		Post-tx: G2: 12.0 (4.7) G3: 7.1 (5.1) Diff at post-tx (p=0.001)		

Table 36. Binge-eating disorder treatment results: Outcomes of included trials comparing behavioral weight loss with an active comparator (continued)

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis approach	Binge-eating outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo et al., 2005[68] Masheb et al., 2007[146]* (continued)		Nonstatistically sig diff in change over time: Weight concern (EDEQ) Shape concern (EDEQ) Eating concern (EDEQ) Dietary restraint (EDEQ) Disinhibition (TFEQ)		
Wilson et al., 2010[151] Sysko et al., 2010[156] G1: **BWL-TL** (64/64) G3: **IPT-TL** (75/75) ITT sample Repeated measures ANOVA Latent Class and Latent Transition Analyses	Abstinence, 24 mo F/up: G1 < G3, OR: 2.6 (sig diff, p=NR) Subgroup Analyses: Abstinence at post-tx: High binge frequency (> 14 binge days/mo) at baseline: G1 (46%) < G3 (66%) (p=NR) Latent Class 3: G1 < G3 Nonstatistically sig diff in change over time: Binge days/mo BED to subthreshold BED	Nonstatistically sig diff in change over time: Weight concern Shape concern Eating concern Dietary restraint Global score	BMI Pre-tx: G1: 36.8 (SD 5.5) G3: 36.3 (SD 5.1) Post-tx: G1: 35.4 (SD 5.7) G3: 35.9 (SD 5.3) Change from baseline: G1 > G3, d=0.48 (p=NR) 5% weight loss Post-tx: G1 (41%) > G3 (15%), OR: 3.9 (p=NR) Nonstatistically sig diff in change over time BMI 5% weight loss	Nonstatistically sig diff in change over time BDI RSE

ANCOVA = analysis of covariance; ANOVA = analysis of variance; BED = binge-eating disorder; BDI = Beck Depression Inventory; BMI = body mass indez; BWLgsh = behavioral weight loss, guided self-help; BWL-TL = behavioral weight loss, therapist-led; CBTgsh = cognitive behavioral therapy, guided self-help; diff = difference; EDE = Eating Disorders Examination; EDEQ = Eating Disorders Examination Questionnaire; G = group; IPT-TL = interpersonal therapy, therapist-led; ITT = intent to treat; kg = kilogram; mo = months; NR = not reported; RSE = Rosenberg Self-Esteem; Patient Version; SD = standard deviation; sig = significant; TFEQ = Three Factor Eating Questionnaire; tx = treatment; wks = weeks; v = versus

Binge-eating outcomes did not differ at the end of treatment for the BWL and active groups[68] or for the BWL group and IPT group.[151] However, at 24-month followup, IPT was better than BWL in the percentage of patients achieving abstinence. Conversely, BWL was better than IPT

in reducing weight in the short term (i.e., at the end of treatment) but this benefit did not persist over the longer-term (2-year) followup.[151]

Evidence for benefits in eating-related psychological and general psychological symptoms including measures of depression and self-esteem was limited to one trial.[68] The investigators reported significantly greater improvements in cognitive restraint and susceptibility to hunger for patients receiving BWL than those receiving the active control.

Behavioral Interventions: Psychodynamic Interpersonal Therapy versus Waitlist

Description of Studies

One trial, involved an interpersonal therapy, namely therapist-led group psychodynamic interpersonal therapy (PIPT) (Table 37).[140] As described earlier in this chapter, PIPT focuses on interpersonal interactions that may contribute to or help maintain eating pathology but employs more complex psychodynamic[160,163] models to clarify patient characteristics related to BED.

For this comparison, the investigators had randomized 88 participants who met DSM-IV criteria for BED to either PIPT (N=48) or a waitlist (N=40). Among all 135 participants including those in a CBT group, 123 (91 percent) were female and 3 were nonwhite (2 percent), with a mean age of 42.8 years and mean BMI in the obese range (41.11 kg/m^2).

Participants assigned to PIPT received 16 weekly, 90-minute sessions led by a therapist, and they were assessed at baseline, end of treatment, and at 6-month followup. Participants assigned to waitlist were assessed at baseline and again at 16 weeks; they were subsequently offered group therapy for binge eating (not analyzed here).

Table 37. Characteristics of trial of psychodynamic interpersonal therapy versus waitlist

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Tasca et al., 2006[140] Canada Outpatient RCT Medium	DSM-IV (SCID/IP, EDE) G1: 48 G3: 40 16 wks (6 mo) ≥ 18 years old Mean Age: 42.8 Mean BMI: 41.1 Female: 91% Nonwhite: 2% Current mood disorder: 62%	G1: PIPT-TL: manualized, 16, 90-min, weekly group sessions G3: Waitlist control Co-interventions: none	Binge (EDE) Days binged Weight BMI Eating Related TFEQ, 2 scales Psychological CES-D total IIP total RSE total

BMI = body mass index; CBT-TL = cognitive behavioral therapy, therapist led; CESD = Center for Epidemiologic Studies Depression Scale; DSM = Diagnostic and Statistical Manual, Fourth Edition; EDE = Eating Disorder Examination Inventory; G = group; IIP = Inventory of Interpersonal Problems; RCT = randomized controlled trial; mo = months; PIPT-TL = psychodynamic interpersonal therapy, therapist-led; RSE = Rosenberg Self-Esteem; SCID/IP = Structured Clinical Interview for DSM-IV Axis I Disorders – Patient Version; TFEQ = Three Factor Eating Questionnaire; wks = weeks

Key Points

- Evidence on the efficacy of PIPT compared with waitlist was limited to one small trial (insufficient evidence).

Detailed Synthesis

Compared with patients assigned to waitlist, those in the PIPT group demonstrated greater change in binge frequency (~ −0.5 versus −3.0 binge days per week) and a higher percentage achieved abstinence (9.1 percent versus 59.5 percent) (Table 38).[140] Overall, PIPT and waitlist control groups did not significantly differ on hunger at the end of treatment; however, those receiving PIPT demonstrated better results on dietary restraint than those on waitlist. BMI decreased in both groups during treatment, but the two groups did not differ significantly at the end of treatment. Patients receiving PIPT had significantly greater improvements in depression than those on the waitlist at the end of treatment. Finally, at the end of treatment, patients receiving PIPT experienced significantly greater reductions in interpersonal problems than those on waitlist; the two groups did not differ significantly on one self-esteem measure.

Table 38. Binge-eating disorder treatment results: Outcomes of psychodynamic interpersonal therapy versus waitlist

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis approach	Binge-eating outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Tasca et al., 2006[140] G1: **PIPT-TL** (48/37/35/37) G3: **Waitlist** (40/33) ITT sample Hierarchical linear model with restricted maximum likelihood method of estimation	Binge days/wk, mean (SD) Pre-tx: G1: 4.11 (1.35) G3: 4.00 (1.52) Post-tx: G1: 1.11 (1.90) G3: 3.58 (2.03) Diff in change over time (post-tx): G1 v G3: (p<0.001) Abstinence, % Pre-tx: NR Post-tx: G1: 59.5% G3: 9.1% Diff at post-tx: G1 v G3: (p<0.001) Improved (< 2 binge days/wk), % Pre-tx: NR Post-tx: G1: 75.7% G3: 12.1% Diff in change over time (post-tx): G1 v G3 (p<0.001)	TFEQ-Restraint, mean (SD) Pre-tx: G1: 7.86 (4.28) G3: 8.10 (4.20) Post-tx: G1: 8.75 (3.94) G3: 6.63 (3.82) Diff in change over time (post-tx): G1 v G3: (p=0.028) Nonstatistically sig diff in change over time (post-tx): TFEQ-Hunger	Nonstatistically sig diff in change over time (post-tx): BMI	CESD, mean (SD) Pre-tx: G1: 24.65 (9.14) G3: 23.84 (9.93) Post-tx: G1: 16.81 (13.13) G3: 23.30 (12.28) Diff in change over time (post-tx): G1 v G3: (p=0.018) IIP total, mean (SD) Pre-tx: G1: 1.39 (0.48) G3: 1.53 (0.61) Post-tx: G1: 1.23 (0.52) G3: 1.50 (0.67) Diff in change over time (post-tx): G1 v G3: (p=0.016) Nonstatistically sig diff in change over time (post-tx): RSE

BMI = body mass index; CBT-TL = cognitive behavioral therapy, therapist-led; CESD = Center for Epidemiologic Studies Depression Scale; G = group; IIP = Inventory of Interpersonal Problems; ITT = intent to treat; RCT = randomized controlled trial; mo = months; PIPT-TL = psychodynamic interpersonal therapy, therapist-led; RSE = Rosenberg Self-Esteem; SD = standard deviation; TFEQ = Three Factor Eating Questionnaire; tx = treatment

Behavioral Interventions: Dialectical Behavioral Therapy

Description of Studies

One trial (Table 39), rated medium risk of bias, evaluated the comparative effectiveness of 20 sessions of therapist-led dialectical behavioral therapy (DBT) versus 20 sessions of therapist-led active comparison group therapy (ACGT) in 101 overweight and obese adults (85 percent female, 79 percent white; mean age, 52.2,), diagnosed with DSM-IV BED.[78,164,165] Both treatments were based on manuals. They consisted of a single pretreatment orientation followed by 20 sessions of treatment; these involved 18 2-hour weekly group sessions and two sessions scheduled every other week.

Table 39. Characteristics of studies of dialectical behavioral therapy versus active comparison

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Safer et al., 2010[78] Safer et al., 2011[164] Robinson and Safer, 2012[165] United States Outpatient primary care RCT Medium	DSM IV (EDE) G1: 50 G2: 51 21 wks (12 mos) Adults, overweight, lived or worked within commuting distance to the clinic Mean age: 52.2 Mean BMI: 36.4 Female: 85% Nonwhite: 24% Current mood disorder: 15%	G1: DBT-TL: Based on Linehan's DBT for borderline PD, previously adapted for BED by Telch, 20 sessions including: 2 intro, 16 sessions of adaptive emotion-regulation skills, 2 sessions for review and relapse G2: ACGT-TL: follows a Rogerian approach Co-interventions: none	Binge: Abstinence Binge days Eating-related EDE, 4 subscales Weight Body weight BMI Psychological BDI RSE NMR Scale EES, 2 scales PANAS DERS, 2 scales

ACGT-TL = active comparison group therapy, therapist-led; BDI = Beck Depression Inventory; BMI = body mass index; DBT = dialectical behavioral therapy; DBT-TL = dialectical behavioral therapy, therapist-led; DERS = Difficulties in Emotion Regulation; DSM-IV = Diagnostic and Statistics Manual for DSM-IV Disorders; EDE = Eating Disorders Examination; EES = Emotional Eating Scale; G = group; intro = introduction; mo = months NMR = Negative Mood Regulation scale; PANAS = Positive and Negative Affect Scale; PD = personality disorder; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem scale; wks = weeks

DBT consisted of two introductory psychoeducational sessions, 16 core skill-learning and skill-building sessions (e.g., mindfulness, emotion regulation, distress tolerance), and two final review and relapse prevention sessions.[166] The investigators had designed ACGT, following a Rogerian approach,[167] as an active comparison group that would generate nonspecific therapeutic factors (i.e., therapeutic alliance, treatment expectations, therapeutic optimism) but was not necessarily intended to act as a standalone treatment for BED. It focused on bolstering self-esteem and encouraging patients to find answers within themselves (versus learning skills as in DBT). Thus, the ACGT approach was intended to match therapeutic alliance and therapeutic optimism factors evoked through DBT but without providing DBT-specific elements of treatment. Outcomes measures were collected at baseline, end of treatment, and at 3-, 6-, and 12-month followup.

Key Points

- DBT was associated with greater improvements in binge-eating outcomes, eating concerns and dietary restraint, and symptoms of depression than ACGT (insufficient evidence).

Detailed Synthesis

This trial reported outcomes related to binge eating, eating-related psychopathology, weight, general psychological, and other outcomes (Table 40).[78] Analyses addressed changes in outcomes from the end of treatment to 6-month followup and, separately, from 6-month through 12-month followup. Secondary analyses examined whether binge-eating outcomes were modified by factors such as rapid response to treatment[164] and personality and dieting history.[165]

At the end of treatment, compared with the active control (ACGT), DBT was associated with a greater percentage of participants achieving abstinence (64 percent versus 36 percent) and with a faster rate of reduction in binge frequency, eating concerns and dietary restraint, and symptoms of depression. Of these benefits, only those related to improvements in eating concerns and dietary restraint persisted through the 12-month followup period. Both age of onset of overweight and dieting and avoidant personality disorder emerged as significant moderators of binge outcomes. Patients with early onset of overweight and dieting assigned to DBT reported significantly fewer binge days at the end of treatment than those assigned to the active control. Additionally, all participants assigned to DBT, regardless of the presence or absence of avoidant personality disorder, demonstrated significantly greater decreases in binge days than those assigned to ACGT. The two groups did not differ in terms of rapidity of response.

Table 40. Binge-eating disorder treatment results: Outcomes of dialectical behavior therapy vs active control

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis approach	Binge-eating outcomes	Eating-related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Safer et al., 2010[78] Safer et al., 2011[164] Robinson et al., 2012[165] G1: **DBT-TL** (50/50) G2: **ACGT-TL** (51/51) ITT sample Linear mixed model Chi-square ANOVA MacArthur method ANOVA T-tests	Binge days/mo Pre-tx: NR Post-tx: NR Diff in change over time (baseline to post-tx): (p=0.001) Abstinence Post-tx: G1: 64% G2: 36% 6mo: G1: 52% G2: 43% Diff in change over time (post-tx to 6mo): (p=0.015) Nonstatistically sig diff in change over time: Binge days, post-tx-12 mo Abstinence, 6-12 mo Abstinence Nonsignificant modifiers of binge days/mo in G1: Age of onset overweight and dieting: Rapid response to tx; Avoidant personality disorder	Eating concern, mean (SD) Pre-tx: G1: 2.25 (1.43) G2: 2.09 (1.32) Post-tx: G1: 0.54 (0.71) G2: 1.14 (1.39) Diff in change over time (p=0.008) 12mo: G1: 0.88 (1.38) G2: 0.66 (0.95) Diff in change over time (p=0.019) Restraint, mean (SD) Pre-tx: G1: 1.73 (1.12) G2: 2.00 (1.28) Post-tx: G1: 1.29 (1.04) G2: 1.91 (1.23) Diff in change over time (p=0.008) 12mo: G1: 1.10 (1.09) G2: 1.85 (1.42) Diff in change over time (p=0.004) Nonstatistically sig diff in change over time (post-tx; 12mo): Weight concern Shape concern EES 3 subscales	Nonstatistically sig diffs at post-tx, 12mo: Weight BMI	BDI, mean (SD) Pre-tx: G1: 17.94 (9.37) G2: 15.27 (6.83) Post-tx: G1: 9.10 (9.21) G2: 10.84 (6.86) Diff in change over time: (p=0.045) Nonstatistically sig diffs in change over time (post-tx, 12mo): RSE PANAS NMR DERS

ACGT = active comparison group therapy; BDI = Beck Depression Inventory; BMI = body mass index; DBT = Dialectical Behavior Therapy; DERS = Difficulties in Emotion Regulation; DSM-IV = Diagnostic and Statistics Manual for DSM-IV Disorders; EDE = Eating Disorders Examination; EES = Emotional Eating Scale; NMR = Negative Mood Regulation scale; PANAS = Positive and Negative Affect Scale; PD = personality disorder; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem scale; wk = week; mo = months

Behavioral Interventions: Inpatient Treatment Versus Inpatient Treatment plus Active Therapies

Description of Studies

Three trials examined treatment efficacy in adults with BED who received treatment in an inpatient setting (Table 41).[168-170] In each trial, patients received a standardized inpatient care program and were randomized to additional active therapies. Two trials used virtual reality for eating disorders modification (VREDIM), which aims to reduce body image distortions and food-related anxiety. The main interventions differed in these trials, which prevented any meta-analysis. We rated two trials as low risk of bias and one as medium risk of bias.

Table 41. Characteristics of trials of inpatient treatment versus inpatient treatment plus various active therapies

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Riva et al., 2002[168] Italy ED Clinic RCT Medium	DSM IV TR (Clinical Interview) Total: 20 G1: NR G2: NR 6.5 wks Females No history of purging in the previous 6 months BMI>30 Mean age: 30.3 Mean BMI: 43.2	G1: IP+VRIDEM with psychotherapy or behavioral therapy designed to deliver an immersive virtual environment composed of seven 3D Healing Experiences, each used by the therapist during a 50-minute session with the patient. G2: IP+Psychonutritional groups based on the cognitive behavior approach, delivered 3 times a week; focused on helping patients understand to modify unhealthy and destructive behavior patterns; teaching methods for improving stress management, problem-solving, and eating.	Binge Abstinence Eating-related DIET, total, 6 subscales Weight NR Psychological BIAQ, total, 4 subscales STAI WELSQ, total BSS, total, 3 subscales FRS CDRS
Cesa et al., 2013[169] Italy Inpatient RCT Medium	DSM IV TR G1: 31 G2: 30 G3: 29 6 wks (12mo) Females, 18-50 Mean age: 31.8 Mean BMI: 40.5	G1: IP+CBT+VRIDEM: IP 15 CBT sessions (5 weekly group sessions and 10 biweekly individual sessions); 10 biweekly VR sessions in which patients practiced eating/emotional/relational management and general decision-making and problem-solving skills. G2: IP+CBT: IP plus 15 CBT sessions over 5 weeks (5 weekly group sessions and 10 biweekly individual sessions). G3: IP: 6-wk hospital-based program of medical, nutritional, physical, and psychological care.	Binge: Number of binge-eating episodes (EDI Symptom Checklist) Eating Related BSS BIAQ CDRS Weight BMI

Table 41. Characteristics of trials of inpatient treatment versus inpatient treatment plus various active therapies (continued)

Author, Year Country Setting Design Risk of Bias	DSM Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Castelnuovo et al., 2011[170] Italy Inpatient and outpatient RCT Low	DSM IV G1: 30 G2: 30 7mo (6mo) Females, 18-50 years Mean age = 33.1 Mean weight = 105.4 kg	G1: IP+CBT: 8 individual sessions, 45 minutes each; outpatient 8 telephone calls with same psychotherapist. Sessions based on approach described by Cooper and Fairburn, emphasizing techniques of self-monitoring, goal setting, time management, prompting and cueing, problem solving, cognitive restructuring, stress management and relapse prevention. G2: IP+BST: 8 individual sessions, 45 minutes each; outpatient 8 telephone calls with same psychotherapist. Sessions emphasized techniques of working on "attempted solutions" (such as keeping control by abstaining from food), using reframing maneuvers, inducing fear of fasting rather than bingeing.	Binge: Number of weekly binge episodes, "assessed with a self-report procedure" BED remission (<2 weekly binge episodes) Psychological OQ 45.2, Global index, 4 scales Weight Percentage of weight loss

BED = Binge-Eating Disorder; BIAQ = Body Image Avoidance Questionnaire; BMI = body mass index; BSS = Body Satisfaction Scale; BST = Brief Strategic Therapy; CBT = cognitive behavioral therapy; CDRS = Contour Drawing Rating Scale; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th edition; DIET = Dieter's Inventory of Eating Temptations; ED = eating disorders; EDI = Eating Disorder Inventory; FRS = Figure Rating Scale; G= group; IP = Inpatient program; kg = kilogram; mo = months; NR = not reported; OQ = Outcome Questionnaire; RCT = randomized controlled trial; STAI = State Trait Anxiety Inventory; VRIDEM = Virtual Reality for Eating Disorders Modification; WELSQ = Weight Efficacy Lifestyle Questionnaire; wks = weeks

One trial included 20 obese adult (ages 18 to 45) females who met DSM-IV criteria for BED for at least 6 months.[168] The inpatient program (mean duration, 6.5 weeks) consisted of a low calorie diet (1200 kcal/day) plus exercise (30 minutes of walking twice per week). The investigators compared inpatient care plus virtual reality for eating disorders modification with inpatient care plus psychonutritional group sessions three times per week. The psychonutritional groups aimed to help participants modify unhealthy lifestyle behaviors using CBT-based principles to improve problem solving and manage stress and eating.

In another trial, 66 (of 90 randomized) obese adult women who met DSM-IV criteria for BED for the previous 6 months completed a 5-week inpatient program consisting of medical, nutritional, physical, and psychological care (24 of the 90 patients discharged themselves from the hospital before treatment was complete).[169] All participants were enrolled in an integrated multimodal medically managed inpatient program. Of the 66 patients, 29 were enrolled in inpatient care only, 20 patients received inpatient treatment plus five group and 10 individual CBT sessions, and 27 patients received inpatient care treatment plus five group CBT sessions and 10 sessions of VREDIM.[168]

The third trial recruited 60 treatment-seeking women (mean weight, 107 kg; mean age, 46).[170] Participants enrolled in a comprehensive treatment program consisting of 1-month

inpatient care plus a 6-month outpatient treatment program. Inpatient treatment consisted of a hospital-based, medically managed program incorporating a hypocaloric diet, nutritional counseling (45-minute group sessions, twice weekly), and physical activity training (daily group programs including postural gymnastics, aerobic activity, and walking). The RCT compared inpatient treatment plus 45-minute individual sessions of CBT (twice weekly) with inpatient treatment plus brief strategic therapy[171171] (twice weekly). In the outpatient component of the treatment program, 30 patients each received either eight CBT or eight BST telephone-based sessions (whichever they had received during their inpatient stay), which aimed to consolidate strategies and abilities learned during inpatient therapy, support motivation, and prevent relapse.

Key Points

- Adding virtual reality therapy to inpatient treatment was associated with greater reductions in body dissatisfaction in two trials that had different inpatient care plans (insufficient evidence) (Table 42).
- The strength of evidence is insufficient to determine the effectiveness of adding various active therapies to inpatient treatment because these formats were studied in single, small sample trials.

Table 42. Strength of evidence for outcomes of interventions for inpatient treatment

Treatment Comparison	Binge Eating	Eating-related psychopathology	Weight	Psychological Outcomes
Inpatient treatment plus VRIDEM vs. Inpatient treatment plus psychonutritional groups	**Insufficient** 1 RCT (N=20) No difference Abstinence	**Insufficient** 1 RCT (N=20) No difference	**Insufficient** No studies	**Insufficient** No studies
Inpatient treatment vs. Inpatient treatment plus CBT	**Insufficient** 1 RCT (N=69) No difference Binge frequency	**Insufficient** No studies	**Insufficient** 1 RCT (N=69) No difference	**Insufficient** No studies
Inpatient treatment vs. inpatient treatment plus CBT and VRIDEM	**Insufficient** 1 RCT (N=60) No difference Binge frequency	**Insufficient** No studies	**Insufficient** 1 RCT (N=60) IP+CBT+VREDIM better	**Insufficient** No studies
Inpatient treatment plus CBT vs. Inpatient treatment plus CBT and VRIDEM	**Insufficient** 1 RCT (N=61) No difference Binge frequency	**Insufficient** No studies	**Insufficient** 1 RCT (N=61) IP+CBT+VREDIM better	**Insufficient** No studies
Inpatient treatment plus CBT vs. Inpatient treatment plus brief strategic therapy	**Insufficient** 1 RCT (N=60) No difference Binge frequency	**Insufficient** No studies	**Insufficient** 1 RCT (N=60) No difference	**Insufficient** No studies

CBT = cognitive behavioral therapy; IP = inpatient program; NR = not reported; RCT = randomized controlled trial; VRIDEM = Virtual Reality for Eating Disorders Modification; vs = versus;

Detailed Synthesis

One trial reported abstinence and eating-related psychopathology outcomes;[168] two trials reported binge frequency and weight-related outcomes;[169,170] and two studies reported on body image concerns (Table 43).[168,169]

Binge-Eating Outcomes

All three trials found nonsignificant differences in binge outcomes at the end of the trial.[168-170] In one trial, CBT was better than brief strategic therapy in the percentage of patients showing

marked improvement in binge eating (i.e., < 2 binges per week) (63 percent versus 20 percent at 6-month followup.[170]

Eating-Related Psychopathology Outcomes

Scores on the Dieter's Inventory of Eating Temptations questionnaire at the end of treatment did not differ significantly between those randomized to virtual reality therapy and those assigned to psychonutritional counseling.[168]

Weight Outcomes

Weight-related outcomes did not differ at the end of treatment in two trials.[169,170] In one trial, however, median BMI was significantly lower at 12-month followup in individuals assigned to virtual reality therapy than in those who were assigned to CBT or received no additional treatment.[169]

General Psychological or Other Outcomes

Virtual reality therapy was associated with greater reductions in Body Image Avoidance Questionnaire (BIAQ) scores than inpatient care plus CBT, inpatient care plus psychonutritional treatment, and inpatient treatment only.[168,169]

Table 43. Binge-eating disorder treatment results: Outcomes of included inpatient treatment versus inpatient treatment plus active therapies

Author, Year Arm (N Randomized/Completed Treatment/ Additional Followup If Any Analysis Approach	Binge-eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Riva et al., 2002[168] G1: **IP+VREDIM** (NR) G2: **IP+Psychonutritional groups** (NR) Total N = 20 Not reported Exact methods with marginal homogeneity test	Nonstatistically sig diff at post-tx: Abstinence	Nonstatistically sig diff in change over time (post-tx): DIET-Total DIET-Positive social DIET-Overeating DIET-Negative emotions DIET-Resisting temptations DIET-Exercise DIET-Food choice	NR	BIAQ-Clothing, mean Pre-tx: G1: 16.10 G2: 14.60 Post-tx: G1: 13.80 G2: 13.80 Diff in change over time: (p=0.035) STAI-Total Pre-tx: G1: 47.80 G2: 39.20 Post-tx: G1: 38.80 G2: 37.70 Diff in change over time: (p=0.035)

Table 43. Binge-eating disorder treatment results: Outcomes of included inpatient treatment versus inpatient treatment plus active therapies (continued)

Author, Year Arm (N Randomized/Completed Treatment/ Additional Followup If Any Analysis Approach	Binge-eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Riva et al., 2002[168] (continued)				WELSQ-Total Pre-tx: G1: 107.60 G2: 129.10 Post-tx: G1: 38.80 G2: 130.30 Diff in change over time: (p=0.005) Nonstatistically sig diffs in change over time (post-tx): Assertion Inventory 2 subscales BSS total and 3 subscales BIAQ-total and 3 subscales FRS 3 subscales CDRS 3 subscales
Cesa et al., 2013[169] G1: **IP+CBT+VREDIM** (31/27/18) G2: **IP+CBT** (30/20/14) G3: **IP** (29/19/12) ITT sample Exact methods with Monte Carlo approximation	Nonstatistically sig diff in change over time (post-tx and post-tx to 12mo): Binge episodes/mo	NR	Weight, median Pre-tx: G1: 97.6 G2: 105.8 G3: 109 Post-tx: G1: 93.6 G2: 100 G3: 102 12mo: G1: 92 G2: 103.7 G3: 112 Diff in change over time (p=0.032) BMI, median Pre-tx: G1: 38.1 G2: 40.8 G3: 42 Post-tx: G1: 36.5 G2: 38 G3: 40.3 12mo: G1: 36.2 G2: 39.1 G3: 41.5	BIAQ-Total, mean (SD) Pre-tx: G1: 34.4 (SD 8.5) G2: 33.85 (SD 5.8) G3: 35.53 (SD 7.16) Post-tx: G1: 27.2 (SD 7.23) G2: 31.95 (SD 6.9) G3: 33.1 (SD 10.26) Diff in change over time (post-tx): (p=0.031) Nonstatistically sig diff in change over time (post-tx): BSS CDRS

Table 43. Binge-eating disorder treatment results: Outcomes of included inpatient treatment versus inpatient treatment plus active therapies (continued)

Author, Year Arm (N Randomized/Completed Treatment/ Additional Followup If Any Analysis Approach	Binge-eating Outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Cesa et al., 2013[169] (continued)			Diff in change over time (p=0.015) Nonstatistically sig diff in change over time (post-tx): Weight	
Castelnuovo et al., 2011[170] G1: **IP+CBT** (30/NR/NR) G2: **IP+BST** (30/NR/NR) Independent samples t tests Chi-square	BED improvement (< 2 episodes/wk), mean (SD) Pre-tx: NR Post-tx: NR 6mo: G1: 20.0% G2: 63.3% Diff in change over time, post-tx to 6mo (p=0.001) Nonstatistically sig diffs in change over time (post-tx): BED improvement (< 2 episodes/wk)	NR	Nonstatistically sig diffs in change over time (post-tx; 6mo): Weight loss	OQ-Symptom distress, mean (SD) Pre-tx: G1: 48.47 (8.42) G2: 52.13 (11.19) Post-tx (diff): G1: -2.7 (3.49) G2: -3.2 (3.04) 6mo: G1: -7.93 (5.12) G2: -14.1 (5.98) Diff in change over time (post-tx to 6mo): (p<0.000) OQ-Global index Pre-tx: G1: 92.37 (11.01) G2: 96.47 (10.22) Post-tx: G1: -5.57 (4.38) G2: -9.4 (7.46) 6mo: G1: 14.47 (12.07) G2: 27.2 (10.91) Diff in change over time (post-tx to 6mo): (p<0.000) Nonstatistically sig diffs in change over time (post-tx, 6mo): OQ-Interpersonal relations OQ-Social role Nonstatistically sig diffs in change over time (post-tx): OQ-Symptom distress OQ-Global index

BED = Binge-Eating Disorder; BIAQ = Body Image Avoidance Questionnaire; BMI = body mass index; BSS = Body Satisfaction Scale; BST = Brief Strategic Therapy; CBT = cognitive behavioral therapy; CDRS = Contour Drawing Rating Scale; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th edition; DIET = Dieter's Inventory of Eating Temptations; ED = eating disorders; EDI = Eating Disorder Inventory; FRS = Figure Rating Scale; G= group; IP = Inpatient program; kg = kilogram; mo = months; NR = not reported; OQ = Outcome Questionnaire; RCT = randomized controlled trial; SD = standard deviation; STAI = State Trait Anxiety Inventory; tx = treatment; VRIDEM = Virtual Reality for Eating Disorders Modification; WELSQ = Weight Efficacy Lifestyle Questionnaire; wks = weeks

Pharmacological Interventions: Combination Treatments Compared with Placebo and with Other Treatments

Description of Studies

Evidence about combination interventions for treating patients with BED consisted of seven placebo-controlled RCTs (Table 44). In all seven trials, investigators combined a medication with a behavioral treatment; in two, they combined a medication with two behavioral treatments.[89,131] The medications consisted of an antidepressant, which was used in three trials;[89,131,172] an anticonvulsant in one trial;[173] and an anti-obesity agent in three trials.[80,174,175] The behavioral interventions included CBT in three trials,[80,131,173] BWL in one trial,[80] CBT plus BWL in one trial,[172] hypocaloric diet in one trial,[175] and group psychological support plus diet counseling in one trial.[89]

Five trials randomized 283 individuals to one of two treatment arms; the remaining two trials[131,172] randomized 224 individuals to one of four treatment arms. As a result, 227 participants were randomized to combination treatment, 226 to behavioral treatment only, 27 to medication only, and 27 to placebo only. We rated four trials as low risk of bias and three trials as medium risk of bias.

Table 44. Characteristics of trials of combination treatments for binge-eating disorder

Author, Year Country Funding source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Claudino, 2007[173] Brazil Outpatient RCT Medium	DSM-IV-TR (SCID-I/P) 18-60 yr., BMI ≥ 30, BES > 17 G1: 37 G2: 36 21 wk (including 2-5 wk single-blind placebo run-in) Mean age: 38.3 Female: 96% Nonwhite: 43% Mean weight: 97.5 Mean BMI: 37.4 History of depression: 36%	G1: CBT + Topiramate, 25 mg/day titrated bi-weekly up to 150, then weekly up to 200 mg/day, then weekly up to 300 mg/day in those with poor response (≤ 5% weight loss or < 50% reduction in binge days) G2: CBT + Placebo Co-interventions: none	Binge • Binge episodes/wk • Binge days/wk Eating-related • BES Psychological • BDI Weight • Weight • BMI

Table 44. Characteristics of trials of combination treatments for binge-eating disorder (continued)

Author, Year Country Funding source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Devlin, 2005[172] United States RCT Medium	DSM-IV (semi-structured interview using the EDE, 12th edition) G1: 28 G2: 25 G3: 32 G4: 31 5 mo 18-70 yr, BMI ≥ 27, maximum weight = 159 kg Mean age: 43 Female: 78% Nonwhite: 23% Mean weight: 115.0 kg. Mean BMI: 40.9 Current major depression: 10.3%	G1: BWL + CBT + Fluoxetine, 60 mg/day G2: BWL + CBT + Placebo G3: BWL + Fluoxetine G4: BWL + Placebo Co-interventions: none	Binge • Binge episodes/mo • Abstinence Eating-related • BES • BSQ • TFEQ, 3 subscales Psychological • BDI • BSI • IIP • RSE Weight • Weight
Golay, 2005[175] Switzerland Outpatient RCT Low	DSM IV (semi-structured interview) G1: 44 G2: 45 24 wk 18-65 yr., BMI ≥ 30 Mean age: 41 Female: 91% Mean weight: 98.4 kg Mean BMI: 36.5	G1: HC diet + Orlistat, 120 mg, 3 times/day G2: HC diet + Placebo Co-interventions: none	Binge • Binge episodes/wk • Remission Eating-related • EDI-2 Psychological • GAD • MDD • HAM-D • HAM-A • BDI Weight • BMI • Weight • % body fat • Waist circumference • Hip circumference • Total energy expenditure Quality of Life • NHP

Table 44. Characteristics of trials of combination treatments for binge-eating disorder (continued)

Author, Year Country Funding source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Grilo et al., 2005[131] United States Primary Care RCT Low	DSM IV (SCID, EDE) G1: 27 G2: 27 G3: 26 G4: 28 18-60 yr., 100% - 200% of ideal body weight Mean age: 44 Female: 78% Nonwhite: 11% Mean BMI: 36.3 Lifetime MDD: 50% Lifetime anxiety disorders: 37%	G1: Fluoxetine: 60 mg/day G2: Placebo: Same dosing as G1 G3: CBT+Fluoxetine: CBT: 16 weeks of individual, 60-min sessions using method of Fairburn et al. Fluoxetine, same as GI G4: CBT+Placebo: CBT: same as G3 Placebo: same dosing as G3 Co-intervention: minimal clinical management (< 15 mn. weekly during first 4 wk., biweekly thereafter)	Binge Binge episodes/mo (EDE-Q) • Binge episodes/mo (daily self-monitoring) Eating-related • EDE-Q global, 4 subscales • TFEQ 3 subscales • BSQ Psychological • BDI Weight • BMI
Grilo, 2005[174] United States Outpatient RCT Low	DSM IV (SCID-I/P, EDE) G1: 25 G2: 25 12 wk (3 mo) 35-60 yr., BMI >30 Mean age: 47 Female: 88% Nonwhite: 12% Mean weight: 114.9 kg Mean BMI: 36	G1: CBTgsh + Orlistat, 120 mg, 3 times/day G2: CBTgsh + Placebo Co-interventions: none	Binge • Binge days/mo • Binge episodes/mo Eating-related • EDE global, 4 subscales Psychological • BDI • RSE Weight • BMI • Weight

Table 44. Characteristics of trials of combination treatments for binge-eating disorder (continued)

Author, Year Country Funding source Setting Design Risk of Bias	Diagnosis (Diagnostic Method) N Randomized Treatment (Length of Post-Treatment Followup) Duration Key Inclusion Criteria Key Characteristics	Intervention Comparator Cointerventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (if any)
Grilo, 2013[80] United States Outpatient RCT Low	DSM-5 (SCID, EDE) G1: 20 G2: 20 4 mo (6 mo) 21-65 yr., BMI ≥ 30, monolingual Spanish speaking Mean age= 45.8 Female = 78% Mean BMI = 38.1 Lifetime axis 1 disorder = 88% Lifetime mood disorder = 82% Lifetime anxiety disorder = 48% Lifetime substance disorder = 30%	G1: BWL + Orlistat, 120 mg, 3 times/day G2: BWL + Placebo Co-interventions: none	Binge • Binge episodes/mo Eating-related • S-EDE total, 4 subscales Psychological • S-BDI Weight • BMI
Laederach-Hofmann et al., 1999[89] Switzerland Outpatient RCT Medium	DSM IV (Semi-structured interview) G1: 15 G2: 16 wk. (6 mo) 20- 60 yr, BMI > 27.5 Mean age = 38.1 Female = 87% Mean weight = 105.7 kg Mean BMI = 39.8	G1: Individual diet counseling + group psychological support + Imipramine: 25 mg, 3 times/day G2: Individual diet counseling + group psychological support + Placebo: same dosing as active tx Co-interventions: none	Eating-related • Binge episodes/wk Psychological • SDRS • HDRS Weight • Weight • BMI

BDI = Beck Depression Inventory; BMI = body mass index; BWL = behavioral weight loss; CBTgsh = CBT guided self-help (culturally enhanced adaptation of the Diabetes Prevention Program delivered in Spanish); chEDE = Eating Disorder Evaluation standardized interview for children; DSM = Diagnostic and Statistical Manual; EDE = Eating Disorder Examination Inventory; EDI = Eating Disorder Inventory; FCI = Food Craving Inventory; GAD = Generalized Anxiety Disorder; G = group; HAM-A = Hamilton Anxiety scale; HAM-D = Hamilton Depression scale (a.k.a., HDRS, Hamilton Depression Rating Scale); Hospital Anxiety and Depression scale; IIP = Inventory of Interpersonal Problems IV = fourth edition; kg = kilogram; MDD = Major Depressive Disorder; mg = milligram; mo = months; N = number; NR = not reported; RCT = randomized controlled trial; RSE = Rosenberg Self-Esteem Scale; S-BDI = BDI, Spanish version; SBE = subjective binge episodes; SCID = Structured Clinical Interview for DSM Disorders; SDRS = Self Depression Rating Scale; S-EDE = EDE, Spanish version; TR = Text Revision; tx = treatment; yr = year

Key Points

- The strength of evidence was insufficient to reach a conclusion concerning efficacy of any specific combination treatment because each combination was studied only in a single, small sample (N < 90) trial.

Detailed Synthesis

Details of the outcomes of these seven trials appear in Table 45. As elsewhere, we comment on binge-eating outcomes, eating-related psychopathology, weight measures, general psychological outcomes, and other outcomes.

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Claudino, 2007[173] G1: CBT + Topiramate (37/30) G2: CBT + Placebo (36/26) 21 weeks (including 2-5 week placebo run-in) ITT Repeated measures random regression	Abstinence G1: 83.8% G2: 61.1% (p = 0.03) Nonstatistically sig diff in rate of change over time: Binge days/wk Binge episodes/wk	Nonstatistically significant difference in rate of change over time: BES	Weight, kg, mean (SD) Pre-tx: G1: 96.6 (16.7) G2: 98.4 (10.9) Post-tx: G1: 89.8 (13.4) G2: 97.5 (10.5) Diff in rate of change over time (p < 0.001) BMI, mean (SD) Pre-tx: G1: 37.4 (4.9) G2: 37.4 (3.5) Post-tx: G1: 35.0 (3.5) G2: 36.7 (4.7) Diff in rate of change over time (p = 0.0002)	Nonstatistically significant difference in rate of change over time: BDI
Devlin, 2005[172] G1: **BWL + CBT + Fluoxetine**, 60 mg/day (28/NR) G2: **BWL + CBT + Placebo** (25/NR) G3: **BWL + Fluoxetine** (32/NR) G4: **BWL + Placebo** (31/NR)	Nonstatistically significant difference in rate of change over time: Binges/month Abstinence	Nonstatistically significant difference in rate of change over time: TFEQ, 3 subscales BSQ	Nonstatistically significant difference in rate of change over time: Weight	BSI, mean (SD): Pre-tx: G1: 45.4 (28.1) G2: 39.4 (32.4) G3: 38.8 (27.7) G4: 45.8 (31.3) Post-tx: G1: 20.3 (26.1) G2: 25.9 (31.8) G3: 26.8 (29.5) G4: 28.8 (30.2) Diff in change over time, G1 > G2 = G3 = G4 (p = 0.01) Nonstatistically sig diff in rate of change over time: BDI RSE IIP

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Golay, 2005[175] G1: **HC diet+Orlistat**, 360 mg/day (44/39) G2: **HC diet+Placebo** (45/32) 24 weeks ITT ANCOVA	Nonstatistically significant difference in change over time: Binge episodes/wk % meeting DSM-IV criteria for BED	EDI total score at post-tx G1: 48.7 G2: 58.5 (p = 0.011) EDI Perfectionism (data in figure) (p < 0.05 EDI Interoceptive awareness (data in figure) (p < 0.05 Nonstatistically sig diff in change over time: EDI all other subscales % Remitted (no longer meets DSM-IV BED)	Weight loss, kg, mean diff b/t groups, −4.84 (p = 0.0001) Fat mass, kg, mean diff b/t groups, −3.69 (p = 0.002)	Nonstatistically significant difference in change over time: BDI HAD % DSM-IV GAD % DSM-IV MDD NHP QOL
Grilo, 2005[131]; Grilo, 2006[176,177]; Grilo, 2012[178] G1: **Fluoxetine**, 60 mg/day (27/21) G2: **Placebo** (27/23) G3: **CBT+Fluoxetine**, 60 mg/day (26/20) G4: **CBT+Placebo** (28/22) 16 weeks (12 months excluding G2) ITT Logistic regression, ANCOVA (baseline adjusted)	Binges/mo (diary/EDE), mean (SD) Pre-tx: G1: 20.0 (11.6) G2: 16.3 (11.9) G3: 22.7 (13.7 G4: 22.8 (14.7) Post-tx: G1: 11.0 (11.2) G2: 7.4 (10.2) G3: 4.2 (6.9) G4: 2.6 (5.8) Diff between groups at 16 wk: (p<0.0001), G1 > G3, G4, G2 > G3 Binge episodes/mo (EDE-Q), mean (SD) Pre-tx: G1: 17.9 (12.2) G2: 13.2 (9.3) G3: 15.2 (7.7) G4: 16.6 (8.9)	EDE-Q Dietary Restraint, mean (SD) Pre-tx: G1: 2.4 (1.7) G2: 2.2 (1.5) G3: 2.5 (1.4) G4: 2.6 (1.5) Post-tx: G1: 2.4 (1.6) G2: 1.8 (1.5) G3: 1.6 (1.4) G4: 1.4 (1.0) Diff between groups at 16 wk (p= 0.01), G1 > G3, G4 Estimated marginal mean (SE) 6 mo f/up : G1: 2.88 (0.31) G3: 1.70 (0.30) G4: 1.56 (0.28) 12 mo f/up : G1: 2.40 (0.30) G3: 1.90 (0.29) G4: 2.37 (0.27)	Nonstatistically significant difference in change over time: BMI at post-tx Weight loss at 6 and 12 mo f/up	BDI, mean (SD) Pre-tx: G1: 16.9 (8.4) G2: 18.7 (9.7) G3: 20.2 (12.1) G4: 16.5 (8.4) Post-tx: G1: 11.8 (9.8) G2: 11.7 (10.3) G3: 9.2 (7.3) G4: 6.5 (6.8) Diff between groups at 16 wk (p= 0.03), G1 > G3, G4: G2 > G4 Estimated marginal mean (SE) 6 mo f/up : G1: 14.44 (1.67) G3: 10.73 (1.64) G4: 10.19 (1.49) 12 mo f/up : G1: 12.88 (1.63) G3: 11.17 (1.57) G4: 11.43 (1.49)

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo, 2005[131]; Grilo, 2006[176,177]; Grilo, 2012[178] (continued)	Post-tx: G1: 10.3 (11.1) G2: 7.2 (9.2) G3: 4.7 (11.9) G4: 1.8 (3.9) Diff between groups at week 16: (p<0.0001), G1 > G3, G4: G2 > G3 Binge episodes/mo (EDE-Q), estimated marginal mean (SE) 6 mo f/up : G1: 11.63 (2.37) G3: 3.94 (1.55) G4: 5.73 (1.43) 12 mo f/up : G1: 11.63 (2.37) G3: 3.94 (1.55) G4: 5.73 (1.43) Diff between groups over time: (p < 0.001), G1 > G3, G4 Abstinence at wk 16 G1: 22% G2: 26% G3: 50% G4: 61% (p = 0.007) G3 > G1 (p = 0.05) G3 > G2 (p = 0.03) G4 > G1 (p = 0.004) G4 > G2 (p = 0.008) Abstinence at 6 mo f/up: G1: 3.7% G3: 34.6% G4: 25% (p = 0.018) G1 < G3, G4	Diff between groups over time: G1 > G3 (p = 0.009) G1 > G4 (p = 0.012) EDE-Q Eating Concern, mean (SD) Pre-tx: G1: 4.0 (1.2) G2: 3.4 (1.4) G3: 3.9 (1.2) G4: 3.6 (1.2) Post-tx: G1: 2.8 (1.8) G2: 2.1 (1.5) G3: 1.5 (1.3) G4: 1.3 (0.7) Diff between groups at 16 wk (p= 0.001), G1 > G3, G4: G2 > G3, G4 Estimated marginal mean (SE) 6 mo f/up : G1: 2.94 (0.34) G3: 2.06 (0.33) G4: 1.85 (0.30) 12 mo f/up : G1: 2.93 (0.33) G3: 1.94 (0.32) G4: 1.99 (0.30) Diff between groups over time: G1 > G3 (p = 0.004) G1 > G4 (p = 0.002) EDE-Q Weight Concern, mean (SD) Pre-tx: G1: 4.1 (0.9) G2: 3.9 (1.5) G3: 4.3 (0.9) G4: 4.0 (0.8)		Diff between groups over time: G1 > G4 (p = 0.03)

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo, 2005[131]; Grilo, 2006[176,177]; Grilo, 2012[178] (continued)	Abstinence at 12 mo f/up: G1: 3.7% G3: 26.9 G4: 35.7% (p = 0.012) G1 < G3, G4	Post-tx: G1: 3.3 (1.3) G2: 3.0 (1.5) G3: 2.4 (1.5) G4: 2.6 (1.0) Diff between groups at 16 wk (p= 0.003), G1 > G3, G4: G2 > G3 Estimated marginal mean (SE) 6 mo f/up : G1: 3.86 (0.30) G3: 2.80 (0.29) G4: 2.91 (0.27) 12 mo f/up : G1: 3.58 (0.29) G3: 2.63 (0.28) G4: 3.03 (0.26) Diff between groups over time: G1 > G3 (p = 0.002) G1 > G4 (p = 0.021) EDE-Q Shape Concern, mean (SD) Pre-tx: G1: 5.0 (0.8) G2: 4.5 (1.4) G3: 5.1 (0.7) G4: 5.0 (0.8) Post-tx: G1: 3.9 (1.7) G2: 3.6 (1.8) G3: 3.1 (1.8) G4: 3.2 (1.4) Diff between groups at 16 wk (p= 0.005), G1 > G3, G4: G2 > G3, G4 Estimated marginal mean (SE) 6 mo f/up : G1: 4.45 (0.34) G3: 3.24 (0.33) G4: 3.74 (0.30)		

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo, 2005[131]; Grilo, 2006[176,177]; Grilo, 2012[178] (continued)		12 mo f/up : G1: 4.41 (0.33) G3: 2.95 (0.31) G4: 3.57 (0.29) Diff between groups over time: G1 > G3 (p < 0.001) G1 > G4 (p = 0.019) EDE-Q Global, mean (SD) Pre-tx: G1: 3.9 (1.2) G2: 3.5 (1.5) G3: 4.0 (1.1) G4: 3.8 (1.1) Post-tx: G1: 3.1 (1.6) G2: 2.6 (1.6) G3: 2.2 (1.5) G4: 2.1 (1.0) Diff between groups at 16 wk (p= 0.005), G1 > G3, G4: G2 > G3, G4 Estimated marginal mean (SE) 6 mo f/up : G1: 3.52 (0.27) G3: 2.50 (0.26) G4: 2.50 (0.24) 12 mo f/up : G1: 3.32 (0.26) G3: 2.40 (0.25) G4: 2.73 (0.24) Diff between groups over time: G1 > G3 (p = 0.001) G1 > G4 (p = 0.003) TFEQ-hunger, mean (SD) Pre-tx: G1: 10.1 (3.3) G2: 9.6 (3.9) G3: 10.0 (3.1) G4: 9.7 (3.2)		

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo, 2005[131]; Grilo, 2006[176,177]; Grilo, 2012[178] (continued)		Post-tx: G1: 8.9 (4.6) G2: 8.4 (4.3) G3: 5.7 (4.0) G4: 6.7 (3.3) Diff between groups at 16 wk (p= 0.01), G3 < G1, G2 TFEQ-disinhibition, mean (SD) Pre-tx: G1: 14.0 (1.3) G2: 13.9 (1.9) G3:14.0 (1.7) G4: 14.2 (1.6) Post-tx: G1: 12.2 (3.6) G2: 12.1 (4.3) G3: 8.3 (4.8) G4: 9.3 (4.8) Diff between groups at 16 wk (p<0.0001), G1 > G3, G4: G2 > G3, G4 BSQ-body dissatisfaction, mean (SD) Pre-tx: G1: 136.3 (26.0) G2: 135.4 (35.2) G3: 139.1 (28.8) G4: 133.5 (24.3) Post-tx: G1: 117.5 (41.5) G2: 123.6 (41.0) G3: 106.0 (40.2) G4: 100.9 (23.5)		

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Grilo, 2005[131]; Grilo, 2006[176,177]; Grilo, 2012[178] (continued)		Diff between groups at 16 wk (p=0.01), G1 > G4: G2 > G3 (note: possible reporting error, G2 not diff than G4) Nonstatistically sig diff in change over time: TFEQ cognitive restraint		
Grilo et al., 2005[174] G1: **CBTgsh+Orlistat**, 360 mg/day (25/19) G2: **CBTgsh+Placebo** (25/20) 12 weeks (3 mo F/up) ITT ANCOVA	Abstinence Post-tx: G1: 64% G2: 36% (p = 0.048) Nonstatistically significant difference in change over time: Binge episodes/month Binge days/month Abstinence 3 mo F/up	Nonstatistically significant difference in change over time: EDE-Q Global and 4 subscales	Weight loss, kg, mean (SD) Post-tx: G1: 3.5 (3.5) G2: 1.6 (2.4) (p = 0.02) % Weight loss Post-tx: G1: 3.3 (3.3) G2: 1.6 (2.4) (p = 0.04) Nonstatistically sig diff in change over time: Weight loss F/up % weight loss F/up	Nonstatistically significant difference in change over time: Post-tx: BDI RSE F/up: BDI RSE
Grilo, 2013[80] G1: **BWL+Orlistat**, 360 mg/day (20/14/18) G2: **BWL+Placebo** (20/15/19) 16 weeks (6 mo F/up) ITT RMANOVA	Nonstatistically significant difference in change over time: Binge episodes/month Binge days/month Abstinence	Nonstatistically significant difference in change over time: EDE-Q Total and 4 subscales	Nonstatistically significant difference in change over time: BMI	Nonstatistically significant difference in change over time: BDI

Table 45. Binge-eating disorder treatment results: Outcomes of included combination treatment trials (continued)

Author, Year Arm (N Randomized/ Completed Treatment/ Additional Followup If Any) Treatment Duration (Length of Post-tx Followup) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Laederach-Hofmann et al., 1999[89] G1: **Imipramine, 75 mg/day** (15/14) G2: **Placebo** (16/15) 8 weeks (24 wk F/up) Completer sample RMANOVA	Binges/wk, mean (SD) Pre-tx: G1: 7.1 (4.1) G2: 7.1 (4.9) Post-tx: G1: 2.5 (2.9) G2: 5.3 (5.1) Diff between groups: (p< 0.02) 24 wk F/up: G1: 4.1 (2.1) G2: 7.2 (4.3) Diff between groups (p< 0.01) Abstinence= NR	NR	Weight, kg, mean (SD) Pre-tx: G1: 96.0 (14.2) G2: 114.8 (29.5) Post-tx: G1: 93. 8(14.4) G2: 113.0 (29.4) Diff between groups in % change: (p< 0.05) 24 wk F/up: G1: 90.8 (13.5) G2: 117.0 (29.2) Diff between groups in % change (p=0.003)	HAM-D, mean (SD) Pre-tx: G1: 22.6 (9.8) G2: 21.3 (12.0) Post-tx: G1: 9.8 (7.0) G2: 16.0 (10.3) Diff between groups in % change: (p=0.02) 24 wk F/up: G1: 12.6 (5.8) G2: 19.2 (8.7) Diff between groups in % change (p=0.01) Nonstatistically sig diff in change over time: SBP DBP Cholesterol Glucose WHR

ANCOVA = analysis of covariance; b/t= between; BDI = Beck Depression Inventory; BED= binge-eating disorder; BES = Binge Eating Scale; BMI= body mass index; BSI = Brief Symptom Inventory; BSQ = Body Shape Questionnaire; BWL= behavioral weight loss; CBT= cognitive behavioral therapy; CBTgsh= cognitive behavioral therapy guided self-help; DBP = diastolic blood pressure; DSM- Diagnostic and Statistical Manual; EDE-Q= Eating Disorder Examination Questionnaire; EDI = Eating Disorders Inventory; F/up = followup; G= group; GAD = Generalized Anxiety Disorder; HAD = Hospital Anxiety and Depression; HAM-D = Hamilton Depression scale; HC=hypocaloric; IIP = Inventory of Interpersonal Problems; ITT= intention to treat;kg=kilogram; MDD = Major Depressive Disorder; mg= milligram; mo=month; N=number; NHP = Nottingham Health Profile; QOL= quality of life; RMANOVA= repeated measures analysis of variance; RSE = Rosenberg Self-Esteem scale; SBP = systolic blood pressure; SD=standard deviation; TFEQ = Three-Factor Eating Questionnaire; tx=treatment; WHR = wait-to-hip ratio; wk=week

Binge-Eating Outcomes

In two of the seven combination trials, a greater percentage of participants in the combination treatment arm achieved abstinence than those in the behavioral treatment alone arm: CBT plus topiramate (84 percent) was more effective than CBT alone (61 percent)[173] and guided self-help plus orlistat (64 percent) was more effective than CBT alone (36 percent).[174] Neither trial, however, found corresponding significantly greater reductions in binge frequency with combination treatment than with behavioral treatment only. One possible explanation for these seemingly contradictory findings is that, among those who did not achieve abstinence, the degree of binge frequency reduction was similar across treatment arms. Conversely, one multi-

component combination trial comparing psychological support plus diet counseling plus imipramine with psychological support plus diet counseling plus placebo found greater reductions in binge frequency (but did not report abstinence as an outcome) among those who received imipramine than those who received placebo at the end of treatment and at 24-week follow-up after treatment ended.[89]

One trial addressed the comparative effectiveness of a combination therapy (CBT plus fluoxetine) with a pharmacological therapy (fluoxetine) alone. Binge frequency was significantly lower and the percentage of participants achieving abstinence was significantly greater following combination therapy.[131]

Eating-related Psychopathology Outcomes

Generally, little evidence emerged for greater effectiveness of combination treatments compared with single pharmacological treatments in eating-related psychopathology outcomes. Hypocaloric diet plus orlistat compared with hypocaloric diet alone resulted in greater reductions in eating disorder symptoms, particularly perfectionism, and greater increases in interoceptive awareness (i.e., the ability to discriminate hunger and satiety and other feelings and sensations).[175] Similarly, the combination of CBT plus fluoxetine was more effective than fluoxetine alone in reducing eating, shape, and weight concerns, dietary restraint, disinhibition, and hunger.[131]

Weight-Related Outcomes

Four trials found greater weight loss with the combination treatment: CBT plus topiramate compared with CBT alone,[173] CBTgsh plus orlistat compared with CBTgsh alone,[174] hypocaloric diet plus orlistat compared with hypocaloric diet alone,[175] and psychological support plus diet counseling plus imipramine compared with psychological support plus diet counseling plus placebo.[89] In contrast, adding fluoxetine to CBT[131] did not produce greater weight loss than either CBT alone or fluoxetine alone;[131] adding fluoxetine to CBT plus BWL also did not lead to greater weight loss than CBT plus BWL alone.[172] Likewise, adding orlistat to BWL did not produce greater reductions in weight than BWL alone.[80]

General Psychological Outcomes

Two of these combination trials found significant improvement in indices of psychological well-being for the intervention group. The combination of BWL plus CBT plus fluoxetine was more effective than BWL plus CBT alone in reducing general psychological symptoms.[172] Psychological support plus diet counseling plus imipramine was more effective than these two interventions plus placebo in reducing symptoms of depression.[89]

Other Outcomes

One trial reported on other outcomes of interest, in this case QOL. QOL scores improved with treatment, but the extent of improvement did not differ between patients receiving BWL plus orlistat and those receiving only BWL.[175]

KQ 2: Harms Associated with Treatments or Combinations of Treatments

Pharmacological Interventions

Description of Studies

In this section, we present our findings concerning harms reported in 28 trials; as noted in methods, we used an additional seven trials that we had rated high risk of bias for examining safety and tolerability.[81,85,87,122-125] In this evidence base, 18 trials included a medication monotherapy arm, 17 included a placebo arm, and 12 included one or more medication plus behavioral intervention arms.

The trials differed in the level of detail used to report harms. For example, some trials provided, by treatment arm, an explicit accounting of events, accompanied by a declaration of attribution of specific events to study discontinuation. These trials were in the minority. More commonly, we observed less rigorous reporting. The investigators might have only reported a list of events by a threshold percentage of participants (e.g., 10 percent or more), or they may have reported events in the medication arm only and broadly stated that they had observed no significant differences between treatment arms. In two trials,[82,132] investigators enumerated adverse events in the treatment arm and stated that the treatment groups did not differ significantly in the number of any individual event; for these two trials, we reported equal numbers of events in the placebo group as indicated in the treatment group.

Several trials provided no information on adverse events or so little information that we could not attribute the harms to either group in the trial.[80,81,88 163,124,131,174,175] For one trial that used a symptom checklist to record adverse events, we subtracted from the total events the reported baseline symptom levels.[138]

For our analysis, we grouped the harms into eight categories of common side effects associated with antidepressants and anticonvulsants: gastrointestinal (GI) upset, dizziness, headache, sexual dysfunction or decreased libido, musculoskeletal pain or discomfort, sleep disturbance, sympathetic nervous system (SNS) arousal, and other. Examples of GI upset include nausea, diarrhea, and vomiting. Examples of SNS arousal include rapid pulse rate, sweating, and dry mouth. Examples of sleep disturbance include insomnia, sedation, and fatigue. We also report, when available, the incidence of study discontinuation attributable to adverse events or side effects by drug type and by treatment arm.

Harms were not consistently or thoroughly reported across all trials; thus, we were not able to do any meta-analyses and our results are qualitative. The main findings and strength of evidence grades appear in Table 46. In describing results, we use “worse” to signify a statistically significant difference; we use “higher” or “lower” to indicate a 2-fold or larger numerical difference that the investigators had not tested for statistical significance.

Table 46. Strength of evidence for commonly reported harms in medication and combination medication plus behavioral treatment trials for binge-eating disorder

Treatment Comparison	GI Upset[a]	SNS Arousal[b]	Sleep Disturbance[c]	Headache	Others[d]
Topiramate vs. placebo, end of treatment	**Low** 2 RCTs (N subjects=468; N events=83) No difference	**Moderate** 2 RCTs (N subjects=468; N events=240) Medication worse[e]	**Low** 2 RCTs (N subjects=468; N events=89) No difference	**Low** 2 RCTs (N subjects=468; N events=73) No difference	**Moderate** 2 RCTs (N subjects=468; N events=179) Medication worse
Topiramate+CBT vs. CBT, end of treatment	**Insufficient** 1 RCT (N subjects=73; N events=40) No difference	**Insufficient** 1 RCT (N subjects=73; N events=33) Combination higher	**Insufficient** 1 RCT (N subjects=73; N events=26) Combination lower	**Insufficient** 1 RCT (N subjects=73; N events=38) No difference	**Insufficient** 1 RCT (N subjects=73; N events=30) Combination higher
Fluvoxamine vs. placebo, end of treatment	**Low** 2 RCTs (N subjects=105; N events=51) Medication worse	**Insufficient** 2 RCTs (N subjects=105; N events=43) Medication higher	**Low** 2 RCTs (N subjects=105; N events=123) Medication worse	**Insufficient** 1 RCT (N subjects=85; N events=72) No difference	**Insufficient** 1 RCTs (N subjects=85; N events=31) Medication higher

[a] Includes constipation, diarrhea, dyspepsia, flatulence, loss of appetite, nausea, gastrointestinal virus, and similar GI conditions

[b] Includes rapid or irregular heart rate, dilated pupils, dry mouth, nervousness, sweating, rapid breathing, thinking abnormality, amnesia, paresthesias, others

[c] Includes abnormal dreams, fatigue, insomnia, sedation, somnolence, yawning

[d] Includes hypertension (high blood pressure), rash or itching, respiratory illness, eructation, urinary hesitancy, rhinitis, depression, bone fracture resulting from accidental injury, sinusitis, language problems, confusion, taste aversion, others

[e] Worse indicates a statistically significant difference, whereas higher and lower indicate ≥ 2-fold numerical difference not tested for statistical significance by the original investigators.

Key Points

- Harms of any type associated with treatment for BED and treatment discontinuations attributable to harms occurred approximately twice as often in patients receiving pharmacotherapy than in those receiving placebo.
- The number of *serious* adverse events was extremely low overall. Nonetheless, it was approximately twice as high among patients receiving a medication than among those receiving a placebo.
- Across all these trials, the most common side effect reported was SNS arousal.
- Topiramate was associated with significantly higher number of SNS arousal and "other" events, based on one large (N=407) trial that reported significant between group differences and two smaller trials that found similar results but did not report whether these differences were statistically significant (moderate strength of evidence for SNS and "other" harms).
- One medium-sized (N=89) trial found significantly higher numbers of GI upset and sleep disturbances in patients who received fluvoxamine than in those who received placebo. Similar findings were reported in one small high risk-of-bias trial) (low strength of for GI upset and sleep harms).

Detailed Synthesis

Table 47 summarizes the side effects reported across trials. The trials are listed *alphabetically by drug name* to facilitate composite views of the separate trials using fluoxetine, fluvoxamine, sertraline, and topiramate. The entries are the numbers of adverse events reported by treatment arms; for example, in the acamprosate trial, 29 events related to GI upset were reported, 20 among patients who received medication and 9 among patients who received placebo. All pharmaceutical trials are placebo-controlled unless otherwise noted in the relevant row.

Table 47. Numbers of harms and discontinuations attributed to harms (intervention/placebo or combination), reported in medication-only and combination medication plus behavioral treatment trials for binge-eating disorder

Medication and Trial (N of subjects)	GI Upset[a]	Dizzy	Headache	Libido	Muscle/ Joint[b]	Sleep Disturbance[c]	SNS Arousal[d]	Other[e]	Total Discontinued (Because of Specific Harm)[f]
Acamprosate[136] (40)	20/9	NR	3/2	NR	NR	4/1	NR	13/21	2/1
ALKS-3[137] (62)	16/7	10/0	9/6	NR	3/5	20/11	5/1	NR	12/NR
Atomoxetine[91] (40)	16/7	3/0	6/4	NR	0/2	9/5	24/9	10/3	3/1
Bupropion[132] (61)	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Chromium[138] (21)	20/18	1/2	9/5	NR	NR	28/13	NR	8/17	0/0
Citalopram[84] (61)	14/6	0/0	8/5	3/1	0/0	13/5	17/8	0/0	2/3
Desipramine+CBT+ BWL[81] (108)	NR	NR	NR	NR	NR	NR	NR	NR	NR
Duloxetine[909] (40)	14/14	NR	NR	NR	NR	1/0	12/12	2/0	3(1)/0
Escitalopram[92] (44)	9/10	0/0	3/4	3/0	0/0	9/8	12/7	7/8	1(1)/2(1)
Fluoxetine (20-60 mg/day)[172] (116)	NR	NR	NR	NR	NR	NR	NR	1/NR	1/NR
Fluoxetine, 60 mg/day[131] (108)	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fluoxetine, 80 md/day[82g] (60)	15/15	NR	NR	4/4	NR	18/18	11/11	4/4	2/2
Fluoxetine (20-60 mg/day)+CBT[125] (65)	NR	NR	NR	NR	NR	1/0	1/0	NR	2/0
Fluoxetine (60 mg/day) and Fluoxetine+CBT[87] (43)	11	NR	3	1	NR	4	NR	NR	5
Fluvoxamine[86] (85)	34/12[h]	24/14	42/28	10/2	21/19	84/28*	27/9	22/9	5/0
Fluvoxamine (300 mg/day) and Fluvoxamine + CBT[87] (44)	13	NR	2	NR	NR	5	NR	NR	7

Table 47. Numbers of harms and discontinuations attributed to harms (intervention/placebo or combination), reported in medication-only and combination medication plus behavioral treatment trials for binge-eating disorder (continued)

Medication and Trial (N of subjects)	GI Upset[a]	Dizzy	Headache	Libido	Muscle/ Joint[b]	Sleep Disturbance[c]	SNS Arousal[d]	Other[e]	Total Discontinued (Because of Specific Harm)[f]
Fluvoxamine[85] (20)	4/1	NR	NR	3/0	NR	8/3	4/3	NR	1(1)/NR
Imipramine+Diet + Psych Support[89] (31)	NR	NR	NR	NR	NR	NR	1/NR	NR/1	1/1
Lamotrigine[135] (51)	4/1	1/2	9/7	0/2	NR	16/7	4/0	9/6	3/1
Orlistat (360 mg/day)+BWL[80] (40)	NR	NR	NR	NR	NR	NR	NR	NR	NR
Orlistat (360 mg/day)+CBT[174] (50)	NR	NR	NR	NR	NR	NR	NR	NR	2/NR
Orlistat (360 mg/day)+Diet[175] (89)	NR	NR	NR	NR	NR	NR	NR	NR	0/4
Sertraline [83] (33)	NR	NR	NR	NR	NR	7/1	NR	NR	0/0
Sertraline (50-100 mg/day)+Topiramate 25 to 150 mg/day)+Diet+CBT [124] (30)	NR	NR	NR	NR	NR	NR	NR	NR	0/0
Topiramate[93] (61)	14/12	8/4	12/7	NR	6/2	14/15	41/15	22/2	6/3
Topiramate[134] (407)	32/25	NR	25/29	NR	NR	34/26	140/44 [h]	116/39*	29(3)/16(3)
Topiramate+CBT(25-300 mg/day)[173] (73)	19/21	11/7	19/19	NR	20/12	6/20	22/11	22/8	1/0
Zonisamide[122] (40)	34/26	4/2	11/9	3/1	7/4	16/9	55/28	14/9	8/4
Zonisamide(25-150 mg/day)+CBT[123] (52)	2/NR	2/NR	2/NR	NR	NR	NR	NR	NR	6

[a] Includes constipation, diarrhea, dyspepsia, flatulence, loss of appetite, nausea, gastrointestinal virus, and similar GI conditions

[b] Includes asthenia, myalgia, pain, weakness

[c] Includes abnormal dreams, fatigue, insomnia, sedation, somnolence, yawning

[d] Includes rapid/irregular heart rate, dilated pupils, dry mouth, nervousness, sweating, rapid breathing, thinking abnormality, amnesia, paresthesias, and others

[e] Other includes hypertension (high blood pressure), rash or itching, respiratory illness, eructation, urinary hesitancy, rhinitis, depression, bone fracture resulting from accidental injury, sinusitis, language problems, confusion, taste aversion, and others

[f] Discontinued because of an adverse side effect; patients discontinuing because of specific serious adverse event are reported within the parentheses.

[g] The investigators reported only the total number of events and claimed that the events did not differ between intervention and comparison groups. Between-group differences were not significant for all symptoms.

[h] Statistically significant difference between treatment arms

BWL = behavioral weight loss; CBT = cognitive behavioral therapy; mg = milligrams; NR = not reported

Across 27 trials, the investigators reported 2,315 events (1,480 in patients receiving a drug; 835 in those receiving placebo). Only two of the 17 trials found significant differences in harms between patients receiving drugs and those receiving placebos. Specifically, fluvoxamine was associated with a significantly higher number of events related to GI upset and sleep disturbances,[86] and topiramate was associated with significantly higher number of SNS arousal and "other" events.[134] Notably, these two trials had the two largest samples; thus, the lack of significant differences in other trials may reflect sample size limitations.

A total of 139 study discontinuations because of adverse events or side effects were reported: 106 among those randomized to medication alone (N=77) or to an intervention that combined a medication behavioral treatment (N=29), and 33 among those randomized to placebo. Very few discontinuations were directly attributed to serious adverse events (7 associated with pharmacotherapy, 3 with placebo). None of the serious adverse events could be directly attributed to study medication.

Behavioral Interventions

Across the body of evidence on trials of behavioral interventions, we found limited evidence of any harms, side effects, or other reasons for discontinuing treatment. The strength of evidence is insufficient to draw any conclusions about safety or tolerability from this body of evidence.

One trial comparing therapist-led CBT with waitlist reported numbers of patients who discontinued treatment for various reasons: dissatisfaction with treatment (CBT, 6; waitlist, 1), lack of time (CBT, 2), major depression (CBT, 1), and unspecified (CBT, 33).[142] Another trial of therapist-led inpatient treatment reported reasons that four patients withdrew (CBT, 3; IPT, 1):[75] dissatisfaction with treatment (2 patients), agoraphobia (1), and unspecified (1).

KQ 3: Differences in the Effectiveness of Treatments or Combinations of Treatments for Subgroups of Adults with Binge-eating Disorder

BED treatment effectiveness for subgroups of patients is particularly important but was not well studied. We found no evidence examining differences in the effectiveness of any of the treatments for BED based on differences in patient sociodemographic or health characteristics. The majority of patients included in these trials were women. No trial reported on outcomes separately by sex, thereby limiting our ability to draw conclusions about differences in effectiveness based on sex.

Grilo and colleagues examined possible moderators of response to BED treatment in two RCTs. In one trial of 108 patients randomized to fluoxetine, placebo, CBT plus fluoxetine, or CBT plus placebo, the study team used mixed-effects models to test the interaction of treatment type with numerous baseline variables to examine differences in effectiveness by key patient characteristics including age and sex.[176] Unfortunately, the authors combined treatment arms in this analysis (fluoxetine alone with placebo alone and CBT alone with CBT plus fluoxetine). Therefore, we could not use their results to evaluate differences in CBT and fluoxetine effectiveness.

In a second trial, they examined whether rapid response to treatment had bearing on binge-eating outcomes in a trial comparing guided self-help interventions (CBT and BWL).[68,154] Rapid response was defined as a 65 percent or greater reduction in binge eating by the fourth (of 12) week of treatment. In a comparison limited to non-rapid responders in both arms, those receiving

CBT had significantly fewer binge episodes as measured by both self-report and the EDE-Q Rapid responders did not have this same CBT result, but those in the BWL group reported significantly greater restraint than those in the CBT group.

Results: Loss-of-Control Eating

Introduction

This chapter presents our analysis of results for each key question (KQ) concerning treatment for two populations with loss-of-control (LOC) eating. The first section deals with treatment for bariatric surgery patients (KQ 6-8); the second deals with treatment for children (KQ 11-13).

Loss-of-Control Eating among Bariatric Surgery Patients

KQ 6: Effectiveness of Treatments or Combinations of Treatments

We found no evidence examining the effectiveness of treatments or combinations of treatments for LOC eating among bariatric surgery patients.

KQ 7: Harms Associated with Treatments or Combinations of Treatments

We found no evidence examining harms associated with treatments or combinations of treatments for LOC eating among bariatric surgery patients.

KQ 8: Differences in the Effectiveness of Treatments or Combinations of Treatments for Various Subgroups

We found no evidence examining differences in the effectiveness of treatments or combinations of treatments for LOC eating among bariatric surgery patients based on differences in patient sociodemographic or health characteristics.

Loss-of-Control Eating Among Children

KQ 11: Effectiveness of Treatments or Combinations of Treatments

Interventions: Comparisons With Waitlist and Other Treatments

Description of Studies

The included evidence about treatment of children for LOC eating consisted of the three small randomized controlled trials (RCTs) indicated in Table 48.[179-181] Two focused on adolescents[180,181] and the third on children 8 to 12 years of age.[179] All participants were overweight or obese. Two trials included boys as well as girls.[179,180]

Table 48. Characteristics of included trials for loss-of-control eating in children

Author, Year Country Funding source Setting Design Risk of bias	Diagnosis (Diagnostic Method) N Randomized Treatment Duration (Length of Post-Treatment Followup) Key inclusion criteria Key Characteristics	Intervention Comparator Co-interventions	Major Benefit Outcome Measures Subgroup Analyses and Comparisons (If Any)
Boutelle et al., 2011[179] United States Outpatient RCT Medium	Eating in the absence of hunger (chEDE) G1:18 G2: 18 8 weeks (6 and 12 months) Overweight and obese, 8 to 12 years of age Mean age:10.3 Mean BMI: 27.4 Female: 58% Nonwhite: 40%	G1: Volcravo: manualized cue-exposure, 8 weekly, 45 minute 8-10 member parent and child group sessions, followed by 30 minute individual parent and child exercise G2: CAAT: manualized appetitie awareness training, 8 weekly, 45 minute 8-10 member parent and child group sessions, followed by 30 minute individual parent and child exercise Co-interventions: None	Binge • OBE, SBE, OOE (child) • Binge, EAH (parent-report) Eating-related • None Weight • BMI Psychological and other • None
Jones et al., 2008[180] United States Internet RCT Medium	Binge eating or overeating behaviors (EBI modified to focus on binge symptoms and objective overeating) G1: 52 G2: 53 16 weeks (9 months) High school students, ≥85th percentile for BMI Mean age: 15.1 Mean BMI: 30.6 Female: 70% Nonwhite: 36%	G1: SB2-BED: manualized, 16-week, Internet-facilitated semi-structured, CBT, self-help program G2: Waitlist control Co-interventions: None	Binge • OBE, SBE • OOE Eating-related • Weight and shape concerns Weight • BMI Psychological and other • Depressed mood • Dietary fat intake
Tanofsky-Kraff et al., 2010[181] United States Outpatient RCT Medium	Loss of control eating in the month prior to the assessment (EDE) G1: 11 G2: 9 12 weeks (6 and 12 months) Girls, 12-17 years of age, BMI 75th-97th percentile Mean age: 15.3 [a] Mean BMI: 25.3 [a] Female: 100% Nonwhite: 50% [a]	G1: IPT-WG: manualized, 12 weekly 75-90 minute group sessions, based on IPT-AST and IPT for BED G2: HE: manualized, 12 weekly 75-90-minute group sessions, "attention-only" comparison Co-interventions: None	Binge • Number of episodes Eating-related • None Weight • BMI Psychological and other • None

[a] Data obtained directly from the first author.

BDI = Beck Depression Inventory; BMI = body mass index; CBT = cognitive behavioral therapy; chEDE = Eating Disorder Evaluation standardized interview for children; DSM = Diagnostic and Statistical Manual; EAH = Eating in the Absence of Hunger; EBI = Eating Behaviors Inventory; EDE = Eating Disorder Examination Inventory; FCI = Food Craving Inventory;

GCBT = Group Cognitive Behavioral Therapy; GPIP=Group Psychodynamic Interpersonal Psychotherapy; G = group; HE = Hey-Durham; IIP=Inventory of Interpersonal Problems; IPT = interpersonal psychotherapy; IPT-AST = IPT-Adolescent Skills Training; IPT-WG = IPT for the prevention of excess weight gain; IV = fourth edition; RCT = randomized controlled trial; mg = milligrams; mo = months; N=number; NR = not reported; OBE = objective binge episodes; OOE = objective overeating episode; SB2-BED: StudentBodies2-BED; SD = standard deviation; SBE = subjective binge episodes; TR = Text Revision; tx = treatment; US = United States

The trials differed in the definition of LOC eating that the investigators used to determine participant eligibility. Boutelle et al. included pre-adolescent children who were eating in the absence of hunger (EAH). The authors proposed EAH as "a key symptom that contributes to episodes of binge eating."[179, p2] They determined EAH with an assessment measure asking children about hunger and fullness following a standard meal. Children qualified for the trial if their EAH was greater than 10 percent of their daily caloric needs. Jones et al., included high school students who reported binge eating on the Eating Behaviors Inventory (EBI);[180] the EBI is a semi-structured diagnostic instrument adapted from the Eating Disorder Examination (EDE) for use with adolescents. Participants were included even if they did not meet EBI criteria for having objective binge episodes (OBEs), subjective binge episodes (SBEs), or objective overeating episodes (OOEs). In the third trial, Tanofsky-Kraff et al. included adolescent girls with LOC eating in the prior month, based on an assessment using the EDE.[181]

Only one trial compared two treatments for BED;[179] the comparisons in the other two studies were with a waitlist control group[180] and an "attention-only" arm.[181]

Key Points

The three included trials were small. In addition, they differed in the criteria used for defining LOC eating among participants, treatment comparisons, and measures used to evaluate binge outcomes. Strength of evidence is insufficient across all outcomes. Table 49 documents the number of trials and numbers of subjects available as evidence for each treatment comparison and outcome.

Table 49. Strength of evidence for outcomes of interventions for loss-of-control eating among children

Treatment Comparison	Binge Eating	Eating-related psychopathology	Weight	Psychological Outcomes	Other Outcomes
Cue-exposure vs. appetite awareness	Insufficient 1 RCT (N= 36) Inconsistent results based on end points and measures	Insufficient No studies	Insufficient 1 RCT (N= 36) No difference	Insufficient No studies	Insufficient No studies
Self-help CBT vs. waitlist	Insufficient 1 RCT (N=105) Greater reduction in OBEs and SBEs at 9 months	Insufficient No studies	Insufficient 1; 105 Greater reduction in BMI at 9 months	Insufficient No studies	Insufficient No studies
Interpersonal psychotherapy vs. non-BED health education "attention only"	Insufficient 1 RCT (N=20) Inconsistent results based on measure	Insufficient No studies	Insufficient 1 RCT (N=20) No difference	Insufficient No studies	Insufficient No studies

BED = binge-eating disorder; BMI = body mass index; CBT = cognitive behavioral therapy; OBE = objective binge episodes; SBE = subjective binge episodes; WW = watchful waiting.

Detailed Synthesis

The one comparative effectiveness trial focused on treatment of pre-adolescent children. Treatment in both arms consisted of eight weekly sessions and included participation by both children and their parents (Table 49).[179] The investigators compared Volcravo, a cue exposure treatment intended to provide children with skills for coping with food cravings, with children's appetite awareness training (CAAT), a system to increase children's sensitivity to hunger and satiety along with coping skills to manage the urge to eat when not hungry. They measured outcomes at the end of treatment and up to a year after treatment.

Of the two trials with adolescent participants, one concerned the efficacy of a 16-week internet-facilitated program called SB2-BED, incorporating cognitive-behavioral principles in a self-help approach, compared with waitlist controls.[180] Adherence was low; 31 percent of the participants never logged on to the Internet program. The second trial with adolescents included a subset of participants with LOC eating who could be analyzed separately. This study compared interpersonal psychotherapy for the prevention of excessive weight gain (IPT-WG) for BED with a health education program that did not address BED.[181] Both arms consisted of weekly group sessions. All participants in both arms completed the programs, attending at least 80 percent of the sessions.

Binge-eating Outcomes

In the comparative effectiveness trial, various measures of binge-eating outcomes may hint at greater improvement with Volcravo than CAAT, but results were not sustained within any one measure and not supported by parent report (Table 50).[179] Volcravo showed greater improvement in EAH at the end of treatment, OBEs at 6-month followup and overeating episodes (OBEs plus objective overeating episodes) at 12-months followup. No child measures at any other endpoints and no parent measures at any endpoints were significantly different.

The trial of SB2-BED, the Internet-based treatment, evaluated binge-eating outcomes through a measure combining OBEs and SBEs and found a greater reduction from baseline through to 9-month followup among the SB2-BED group.[180] In contrast, the study of IPT-WG showed mixed results at followup of 6-months post treatment. The IPT-WG group had a greater reduction in LOC episodes compared to the health education group but no difference in change in binge episodes.[181]

Table 50. Loss-of-control eating in children treatment results: Outcomes of included intervention trials

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Boutelle et al., 2011[179] G1: Volcravo (18/16/16/12) G2: CAAT (18/16/16/11) ITT sample Generalized linear mixed model; data presented are predicted means; p-values present difference between groups in change over time from baseline	EAH (eating in the absence of hunger, expressed as a percent of daily caloric needs) Baseline: G1: 20% G2: 18% End of treatment G1: 10% G2: 19% (p < 0.001) 6-month followup (p=NS) 12-month followup (p=NS) OBE Baseline: G1: 1.22 G2: 0.89 End of treatment (p=NS) 6-month followup G1: 0.00 G2: 0.44 (p < 0.001) 12-month followup (p= NS) Overeating episodes (OBE+OOE) Baseline: G1: 1.61 G2: 0.94 Post-treatment (p=NS) 6-month followup (p=NS) 12-month followup G1: 0.00 G2: 0.10 (p < 0.001) Nonstatisticially sig diff in change over time at all end points: SBE Loss of control eating EAH (parent reported) Binge eating (parent reported)	NR	Nonstatisticially sig diff in change over time at all end points: BMI BMI (parent reported)	NR

Table 50. Loss-of-control eating in children treatment results: Outcomes of included intervention trials (continued)

Author, Year Arm (N Randomized/Completed Treatment/Additional Followup If Any) Analysis Approach	Binge-eating outcomes	Eating-Related Psychopathology Outcomes	Weight Outcomes	Psychological and Other Outcomes
Jones et al., 2008[180] G1: SB2-BED (52/46/44) G2: WLC (53/47/43) ITT sample Linear regression; mean change in effect size	OBEs and SBEs Baseline: G1: 18.37 (22.63) G2: 8.27 (17.75) Post-tx: G1: 7.44 (17.89) G2: 6.16 (16.10) 9-months: G1: 9.0 (19.45) G2: 3.20 (8.92) (p <0.05) Nonstatisticially sig diff in change over time: OOEs	NR	BMI, mean (SD), kg/m^2 Baseline: G1: 30.53 (5.17) G2: 31.03 (6.29) Post-tx: G1: 29.22 (5.2) G2: 30.44 (6.69) 9-months: G1: 29.83 (5.3) G2: 31.47 (6.55) (p <0.05) BMI, z score, mean (SD) Baseline: G1: 1.79 (0.49) G2: 1.81 (0.52) Post-tx: G1: 1.60 (0.58) G2: 1.68 (0.62) 9-months: G1: 1.61 (0.61) G2: 1.78 (0.57) (p < 0.001)	Nonstatisticially sig diff in change over time: Depressed mood
Tanofsky-Kraff et al., 2010[181] G1: IPT-WG (11/11/11) G2: HE (9/9/9) No attrition Linear model with repeated measures and group interaction term	Reduction in loss of control episodes (SD): 6 months: G1: 0.53 (0.9) G2: 0.21 (0.5) (p=0.036) Nonstatistically sig diff in change over time at 6 months: Binge episodes	NR	Nonstatistically sig diff in change over time at 1 year: BMI	NR

BDI = Beck Depression Inventory; BMI = body mass index; CI = confidence intervals; DSM = Diagnostic and Statistical Manual; EDE = Eating Disorder Examination Inventory; FCI = Food Craving Inventory; G = group; HE = Hey-Durham; IIP=Inventory of Interpersonal Problems; IPT = interpersonal psychotherapy; IPT-AST = IPT-Adolescent Skills Training; IPT-WG = IPT for the prevention of excess weight gain; ITT = intent-to-treat; mg = milligrams; N=number; NR = not reported; OBE = objective binge episodes; OOE = objective overeating episode; RCT = randomized controlled trial; SD = standard deviation; SBE = subjective binge episodes; TR = Text Revision; tx = treatment; US = United States; wks = weeks

Weight Outcomes

Only the trial of SB2-BED (the internet-facilitated intervention) showed a significant difference between arms in change in BMI at any post-treatment evaluation.[180] Mean BMI declined in the SB2-BED arm from 30.53 kg/m^2 at baseline to 29.83 kg/m^2 at 9-month followup; it rose in the control group from 31.03 kg/m^2 to 31.47 kg/m^2 (p<0.05).

Other Outcomes

No trial reported on eating-related psychopathology, psychological, or other outcomes.

KQ 12: Harms Associated with Treatments or Combinations of Treatments

We found no evidence examining harms associated with treatments or combinations of treatments for LOC eating among children.

KQ 13: Differences in the Effectiveness of Treatments or Combinations of Treatments for Subgroups of Children

We found no evidence examining differences in the effectiveness of treatments or combinations of treatments for LOC eating among children based on differences in patient sociodemographic or health characteristics.

Results: Course of Illness

Introduction

This chapter presents the results of our literature search and findings for key questions (KQs) concerning course of illness in individuals with binge-eating disorder (BED), bariatric surgery patients with loss of control (LOC) eating, and children with LOC eating. For each group, we examine the course of illness for 1 year or longer and explore whether course of illness differs by patient characteristics and duration of illness. We report our results separately for each condition in the three main sections of the chapter.

The review focuses on five main outcome categories: binge eating or LOC eating, eating-related scale measures, weight or body mass index (BMI), psychiatric or psychological variables, and a catchall category for all other outcomes. We present summary tables describing characteristics of studies including the study design, the diagnostic criteria used to determine BED or LOC eating, patient characteristics, and outcomes. Separate outcomes tables present the analytic approach and results for each outcome category. Articles that discuss results from the same study are grouped in the same row.

Study designs are all observational. They include longitudinal case-control (following a group of individuals with the condition and a matched group of individuals without), community cohort (following a group of individuals with the condition), and patient case series (following a group of individuals with the condition who received treatment). Because of the small number of studies meeting our inclusion criteria, we used case series studies that we had determined to be at high risk of bias based on an assessment relevant for observational studies. In addition to other possible shortcomings, these studies follow one group with BED over time and do not control for characteristics that may be related to the outcome.

Binge-Eating Disorder

KQ 4: Course of Illness

Description of Studies

Our discussion of the course of illness among individuals with BED is based on evidence from seven studies (Table 51). All these studies of course of illness were limited to participants who had earlier participated in BED treatment studies. Four of the studies assessed patient outcomes following outpatient behavioral interventions. They included 1 year following cognitive behavioral therapy (CBT),[182]1 year following group CBT or group interpersonal psychotherapy (IPT),[129] 1 year following Group Psychodynamic Interpersonal Psychotherapy (GPIP),[183] and 3 years following CBT.[184] The course of illness of one group of patients who received inpatient treatment was assessed at 3-, 6-, and 12-year followup.[128,185-187] Another study compared reproductive health outcomes in women with BED with those of matched controls.[188] Finally, one study looked at the risk of suicide 5years following treatment in relationship to the risk in the general population.[189]

Table 51. Characteristics of course of illness studies among individuals with binge-eating disorder

Author, Year Country Design Length of Time Followed Risk of Bias	Research Objective Definition of Binge-eating disorder	Groups (Number Analyzed) Key Population Characteristics at Baseline	Major Outcome Categories Measures Subgroup Analyses and Comparisons (If Any)
Agras et al., 1997[182] United States Post-treatment cohort High	To examine course of illness in a BED cohort 1 year following the end of CBT and weight loss treatment BED diagnostic criteria not specified	BED post-treatment cohort G1: 93 at baseline, end of treatment analysis cohort (N= 76) Mean age: 46 Female: 100% Nonwhite: 8% BMI: 36.7	Binge eating Number of days with one or more binges Abstinence Weight BMI
Castellini et al., 2012[184] Italy Post-treatment cohort Medium	To examine course of illness in a BED cohort 3 years following the end of CBT BED meeting DSM-IV-TR assessed by Structural Clinical Interview	BED post-treatment cohort G1: Started treatment (N=150); Included in analysis of change over time (N=133) Mean age: 43.9 (18-60) Female: 88% Nonwhite: NR BMI: 38.0 (7.3)	Binge eating Objective binge episodes Subjective binge episodes Weight BMI
Fichter et al., 1993;[185] Fichter et al., 1998;[128] Fichter et al., 2003;[186] Fichter et al., 2008[187] Germany Post-treatment cohort Fichter et al., 1993;[185] Fichter et al., 1998;[128]: High Fichter et al., 2003;[186] Fichter et al., 2008[187]: Medium	To examine course of illness in a BED cohort 3, 6, and 12 years following inpatient treatment DSM-IV through self report, chart review and therapist diagnosis	BED post-treatment cohort G1: started treatment (N=68); followup at 3 years (N=67); followup at 6 years (N=67); followup at 12 years (N=62) Mean age: 29.3 Female: 100% Nonwhite: NR BMI: 33.7	Binge BED Any eating disorder Binge eating episodes Binge severity Eating related EDI ANIS SIAB Weight BMI Psychological BDI
Linna et al., 2013[188] Finland Post-treatment cases matched to controls Low	To examine reproductive health outcomes in BED treatment patients compared to matched controls DSM-IV	BED post-treatment cohort:G1 (N= 149) matched controls: G2 (4 controls per patient) Mean age: 34.1 (29.3-40.1) Female: 100% Nonwhite: NR BMI: NR	Other Miscarriage

Table 51. Characteristics of course of illness studies among individuals with binge-eating disorder (continued)

Author, Year Country Design Length of Time Followed Risk of Bias	Research Objective Definition of Binge-eating disorder	Groups (Number Analyzed) Key Population Characteristics at Baseline	Major Outcome Categories Measures Subgroup Analyses and Comparisons (If Any)
Maxwell et al., 2014[183] Canada Post-treatment cohort Medium	To examine whether changes in attachment insecurity are related to 1 year outcomes in a BED population that received Group Psychodynamic Interpersonal Psychotherapy (GPIP) DSM-IV	BED post-treatment cohort G1: started treatment (N= 102), followup at 1 year (N=55) Mean age: 44.3 Female: 100% Nonwhite: 11% BMI: all ≥ 27	Binge Days binged
Preti et al., 2011[189] Review Medium	To examine the risk of suicide in BED populations followed for 5 years or more compared to the general population DSM-IV	Cohorts of BED patients from 3 studies G1: 246 Mean age: NR Female: NR Nonwhite: NR BMI: NR	Other Suicide
Wilfley et al., 2000[129] United States Post-treatment cohort Medium	To examine the relationship of comorbid psychopathology to severity of binge eating, and degree of overall eating pathology 1 year following group cognitive-behavioral therapy (CBT) or group interpersonal therapy (IPT) treatment. DSM-IV assessed through the Eating Disorder Examination (EDE)	BED post-treatment cohort G1: 162 Mean age: 45.2 (18-65) Female: 83% Nonwhite: 7% BMI: 37.1	Binge Binge episodes OBEs

BED = binge-eating disorder; BMI = body mass index; DSM = Diagnostic and Statistical Manual; G = group; GUTS = Growing Up Today Study; N=number; RoB = risk of bias

Key Points

- A small number of studies examined the course of illness among individuals with BED. All were limited to patient populations following treatment; none followed a cohort identified in the community. One study used a case series design, comparing outcomes in a treatment population to those in matched controls identified through a registry.
- Binge outcomes were the most commonly reported outcomes across studies. Studies differed in the characteristics that the investigators had hypothesized might be related to better outcomes (strength of evidence insufficient).
- One study found an increased odds of miscarriage among women with BED (strength of evidence insufficient).
- A review article of three studies found no evidence of increased risk of suicide among BED patients 5 years after treatment.

Detailed Synthesis

Binge-eating Outcomes

Binge-eating outcomes were assessed in four studies that followed behavioral intervention patients for 1 year or more after therapy ended and an additional study involving women receiving inpatient care (Table 52). The focus of the analyses differed across studies.

Table 52. Binge-eating disorder, course of illness: Binge-eating outcomes

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
Agras et al., 1997[182] G1: (N=76) Repeated measures ANOVA	52 weeks, 70 weeks, and 88 weeks post treatment Number of days with one or more binges Differences between group that achieved abstinence by 12 weeks of treatment and group that did not: 52 weeks (p=NS), 70 weeks (p= 0.04), 88 weeks (p=0.05)
Castellini et al., 2012[184] G1: (N=133) Multiple linear regression	3 years post CBT treatment Baseline OBEs/week: 5 (2-10) Predictors of change in OBEs (per week episodes) from baseline to 3 year FU: baseline OBE frequency: B= 0.65 (p < 0.001) EES anxiety: B= -0.23 (p <0.01) EES depression: B = -0.39 (p < 0.001) Variables included in model that were not significant: gender, age, BMI, SCL-90 GSI Baseline SBEs/week: G1: 4 (0-8) Predictors of change in SBEs (per week episodes) from baseline to 3 year FU: baseline SBE frequence: B= 0.74 (p < 0.001) BDI: B= -0.34 (p <0.001) EES depression: B = -0.39 (p < 0.001) Variables included in model that were not significant: gender, age, BMI, EES depression
Fichter et al., 1993;[185] Fichter et al., 1998;[128] Fichter et al., 2003;[186] Fichter et al., 2008[187] G1: started treatment (N=68); followup at between 2 or 3 years (N=67); followup at 6 years (N=67); followup at 12 years (N=62) Structural equation model (SEM) of the path of BED Stepwise logistic regression to identify predictors of 12-year followup	2, 6, & 12 years post-inpatient treatment Binge eating ≥ 2 times per week at 3 years: 16%; at 6 years: 34% SEM results: BED at start of tx sig predicted BED at end of tx; BED at end of tx predicted BED at 2 year followup and at 6 year followup Non-eating related (general) psychopathology did not predict BED at future endpoints. Predictors of poor diagnostic outcome at 12 years (any eating disorder---AN, BN, BED or ED-NOS): psychiatric comorbidity OR, 6.00 (1.17 to 30.95) Severe sexual abuse: OR, 4.55 (1.04 to 1.9) Other non-significant predictor: self-injury Predictors of poor binge episode outcome at 12 years (one or more binges occurred in the three months preceding follow-up) Psychiatric comorbidity OR, 13.09 (1.45-118.62) other non-significant predictors: self-injury, emotional liability, interoceptive awareness, obesity of patient's father Predictors of poor binge severity outcome at 12 years (severe and frequent binges, meeting DSM-IV definition) Impulsivity: OR, 13.60 (1.57–117.68) Psychiatric comorbidity: OR, 12.37 (1.42–107.79) Other non-sig predictors: self-injury, inefficiency

Table 52. Binge-eating disorder, course of illness: Binge-eating outcomes (continued)

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
Maxwell et al., 2014[183]	1 year post treatment
BED post-treatment cohort G1: started treatment (N= 102), followup at 1 year (N=55) Time-varying covariate model	Days binged in the past 28 days: Neither attachment avoidance nor attachment anxiety related to change in days binged (p=NS)
Wilfley et al., 2000[129]	I year post treatment
BED post-treatment cohort G1: 162 Repeated measures MANOVA	Binge episodes at 1 year followup: Axis II psychopathology vs. not (p=ns) Binge episodes at 1 year followup: Cluster B psychopathology (narcissistic, borderline, histrionic, or antisocial) vs. not (p=0.022) Binge episodes at 1 year followup: Axis I psychopathology (mood, anxiety, or substance abuse disorder) vs. not: (p=NS)

BMI = body mass index; DSM = Diagnostic and Statistical Manual; EDE = Eating Disorder Examination Interview; EES = emotional eating scale; FCI = Food Craving Inventory; G = group; LOC = loss of control; mg = milligrams; N=number; NR = not reported; OBE = objective binge episodes; SD = standard deviation; SBE = subjective binge episodes; SM = self-monitoring daily record; TR = Text Revision; tx = treatment.

Agras et al. compared those who had achieved abstinence during treatment and those who had not.[182] With respect to the number of days with one or more binges, the researchers did not find a statistically significant difference between the groups, at 52 weeks but did at further endpoints (70 and 88 weeks); the early abstinence group had fewer binge days. Another study examined 1-year binge episode outcomes by differences in coexisting psychopathology.[129] Cluster B personality disorders (narcissistic, borderline, histrionic, or antisocial) were related to worse outcomes. Maxwell and colleagues determined that, at 1 year, days binged in the previous 28 days were not related to decreases in attachment anxiety or attachment avoidance.[183] Castellini et al. separately assessed predictors of changes in objective binge episodes (OBEs) and subjective binge episodes (SBEs) 3 years following the end of treatment.[184] Lower OBE reduction at followup was related to OBE frequency at baseline and higher depression and anxiety based on the Emotional Eating Scale (EES), controlling for age, sex, and BMI. Lower SBE reduction over the same period was related to SBE frequency at baseline and to depression, as measured by the Beck Depression Inventory (BDI), controlling for age, sex, and BMI.

Fichter and colleagues followed 68 women who had received inpatient treatment at a clinic in Germany. In one analysis, the researchers developed latent constructs using factor analysis and included these in a structural equation model to examine the interaction between eating disorder pathology and non-eating-related (general) psychopathology over time (from the start of treatment through to 6-year followup).[186] They found that BED at each time point (start of treatment, end of treatment, 2-year followup) predicted BED at each of the later time points. In contrast, only between end of treatment and 2-year followup did non-eating-related (general) psychopathology predict future BED. General psychopathology was derived from depression measures and indicators from the Hopkins Symptom Checklist (SCL): somatization, obsessive-compulsive behavior, anger/hostility, phobic anxiety, and anxiety. In a second analysis, based on logistic regression analysis, having any psychiatric comorbidity before treatment was related to three separate 12-year outcomes, controlling for other characteristics; these were having an eating disorder diagnosis, a poor binge episode outcome, and a poor binge severity outcome.[187]

Eating-Related Outcomes

The Fichter research team examined an eating-related outcome other than binge eating (Table 53). They conducted eating disorder inventory (EDI) followup assessments of their inpatient treatment group at 3 and 6 years.[128] The total EDI score incorporates subscores measuring drive for thinness, bulimia, body dissatisfaction, ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness and maturity fears. The EDI total score at both 3 and 6 years was lower than it had been before treatment, but it was not significantly different from the end of treatment.

Table 53. Binge-eating disorder, course of illness: Eating-related outcomes

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
Fichter et al., 1993;[185] Fichter et al., 1998;[128] Fichter et al., 2003;[186] G1: started treatment (N=68); followup at 3 years (N=67); followup at 6 years (N=67) MANOVA	3 & 6 year followup EDI total: start of treatment vs. followup at 3 years: ($p < 0.001$) EDI total: end of treatment vs. followup at 3 years: (p=NS) EDI total: start of treatment vs. followup at 6 years: ($p < 0.001$) EDI total: end of treatment vs. followup at 6 years: (p=NS)

EDI = Eating Disorder Inventory; G = group; MANOVA, multivariate analysis of variance;N= number; NS = nonsignificant

Weight Outcomes

Only two studies measured change in BMI over time. Results were mixed (Table 54).[128,184,187] No study examined factors that may be related to change in weight or BMI.

Table 54. Binge-eating disorder, course of illness: Weight outcomes

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
Castellini et al., 2012[184] G1: (N=133)	3 year followup BMI start of treatment (SD): 38.0 (7.3) BMI 3 year followup (SD): 37.1 (7.4) ($p < 0.05$)
Fichter et al., 1993;[185] Fichter et al., 1998;[128] Fichter et al., 2003;[186] G1: started treatment (N=68); followup at 3 years (N=67); followup at 6 years (N=67) followup at 12 years (N=62) MANOVA	3, 6, and 12 year followup BMI, start of treatment: 33.7 (9.0) BMI, followup at 3 years: 31.9 (9.9) BMI, followup at 6 years: 32.7 (10.1) BMI, followup at 12 years: 32.0 (9.2) Difference across time: (p=NS)

BMI = body mass index; G = group; MANCOVA = multivariate analyses of covariance; N=number;

Psychological Outcomes

Among the included studies, only Fichter and colleagues measured psychological outcomes (Table 55).[128] Depression, measured by the BDI, was improved overall from the start of treatment through to 6-year followup; the mean BDI value was lowest, however, at the end of treatment.

Table 55. Binge-eating disorder, course of illness: Psychological outcomes

Author, Year Groups (Number analyzed) Analysis approach	Length of Time Followed Outcomes
Fichter et al., 1993;[185] Fichter et al., 1998;[128] Fichter et al., 2003;[186] G1: started treatment (N=68); followup at 3 years (N=67); followup at 6 years (N=67) MANOVA	6 year followup BDI start of treatment: 23.2; end of treatment: 11.6; followup at 6 years: 15.3 BDI: start of treatment v followup at 6 years: ($p < 0.001$) BDI: end of treatment vs. followup at 6 years: ($p < 0.01$) MANCOVA: 25.7 ($p < 0.001$)

BMI = body mass index; G = group; N=number; MANCOVA,, multivariate analysis of covariance.

Other Outcomes

One study examined the relationship between BED and poor birth outcomes; another investigated risk of suicide (Table 56). In a Finnish study, Linna and colleagues matched a cohort of women with BED who had received treatment at one clinic to controls using population registry data.[188] The odds that a women with BED would suffer a miscarriage, compared with having at least one live childbirth, were more than 3 times greater than the odds of matched controls who did not have an eating disorder. Preti et al. attempted to estimate the risk of suicide among individuals with BED followed for 5 or more years, using results from earlier studies.[189] Three studies met their inclusion criteria but because none reported any suicides, the authors could not calculate a standardized mortality ratio.

Table 56. Binge-eating disorder course of illness: Other outcomes

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
Linna et al., 2013[188] G1: Cases (N= 149) G2: Controls (N= 596) Logistic regression: Controls matched by sex, age, and geographic area	Outcome measured as first childbirth, induced abortion, or miscarriage Miscarriage: (compared with childbirth): OR, 3.18 (1.52 to 6.66) in BED group compared to matched controls
Preti et al., 2011[189] G1: 3 studies (N=246)	5 or more years Suicide: Standardized mortality ratio could not be calculated because included studies had not reported any suicides.

BED = binge-eating disorder; G = group; OR = odds ratio

KQ 5: Differences in Course of Illness by Age, Sex, Race, Ethnicity, Sexual Orientation, Initial Body Mass Index, Duration of Illness or Coexisting Conditions

We found no evidence examining differences in the course of illness among individuals with BED based on differences in sociodemographic or health characteristics.

Loss-of-Control Eating Among Bariatric Surgery Patients

KQ 9: Course of Illness

Description of Studies

The included evidence about the course of illness among bariatric surgery patients who had loss-of-control (LOC) eating consisted of two studies (Table 57).[130,190] Both studies identified whether patients had BED or LOC eating (or both) before surgery, followed the cohort for 1 year or more after surgery, and compared outcomes between patients who initially had experienced LOC eating and those who had not. The two studies differed in the criteria used to define LOC eating and the length of time that they followed patients. Although both studies examined weight outcomes, only one examined binge outcomes.[190]

Table 57. Characteristics of course of illness studies among bariatric surgery patients

Author, Year Country Design Length of Time Followed Risk of Bias	Research Objective Definition of LOC Eating Groups (Number Analyzed)	Key Population Characteristics at Baseline	Major Outcome Category Measures Subgroup Analyses and Comparisons (If Any)
Busetto et al., 2005[130] Italy Longitudinal cohort with comparison group 5 years Medium	To investigate the 5 year outcomes of morbidly obese patients with BED (compared with those without BED) treated surgically with LAGB BED, before surgery, based on DSM IV criteria, diagnosed by clinical assessment G1: Cases with BED before surgery, DSM-IV (as proposed) established through clinical interview (N= 130) G2: Comparisons without BED before surgery (N= 249)	Mean Age: G1: 36.0 (10.3), G2: 38.3 (10.9) (p<0.05) Female: G1: 79.2%, G2: 71.5% (p<0.05) Nonwhite: NR Mean BMI: G1: 47.7 (7.4), G2: 46.6 (7.3) (p=NS)	Weight Excess weight loss Weight regain
White et al., 2010[190] United States Longitudinal postsurgical cohort with comparison group 12 & 24 months post surgery Medium	To investigate 12 and 24 month outcomes, post-bariatric surgery, among those with LOC eating (before and post-surgery) and those without LOC eating: any LOC eating episodes in the previous 28 day period, as measured by the EDE-Q. Includes both objective binge episodes (OBEs) and subjective binge episodes (SBEs) G1: Cases with LOC eating before surgery (N= 220) G2: Comparisons without LOC before surgery (N= 141)	Mean age: 43.7 (10.0) Female: 86% Nonwhite: 18.6% Mean BMI: 51.1 (8.3) Mean depression score: Pre-Op LOC: 17.1 (9.7); No pre-op LOC: 11.1 (8.0) (p=0.000)	Binge eating LOC episodes Weight Weight regain BMI

BED = binge-eating disorder; BMI = body mass index; DSM = Diagnostic and Statistical Manual; G = group; LAGB = laparoscopic adjustable gastric banding; LOC = loss of control; N=number; NR = not reported; Pre-op=preoperative

Busetto et al.[130] followed for 5 years post-surgery 379 obese patients who were treated by laparoscopic adjustable gastric banding at one hospital; their patients included 130 who had been identified as having BED before surgery in accordance with DSM-IV criteria. At baseline, compared with non-BED patients, patients with BED were significantly more likely to be

younger (approximately 2 years) and female and to engage in night eating. All patients with BED were provided with some psychotherapy before surgery. Without adjusting for any of these potential confounding factors, outcome differences between those with and without BED before surgery were compared after 5 years.

In the other study, White and colleagues followed 361 gastric bypass surgery patients for up to 2 years after their operation.[190] Before surgery, BED was not diagnosed in patients. Rather they were identified as experiencing LOC eating based on three definitions: OBEs, eating unusually large amounts of food while experiencing a subjective sense of loss of control; SBEs, experiencing a sense of loss of control while eating small or normal amounts of food; and LOC-general, defined as experiencing either OBEs or SBEs. Researchers assessed LOC based on patient self-report using the Eating Disorder Examination Questionnaire.

Key Points

- The two studies providing evidence for bariatric surgery patients with LOC eating differed in the criteria used for defining LOC eating at baseline, before surgery. One study found that LOC eating before surgery was related to LOC eating following surgery but not to weight loss or weight regain. Strength of evidence is insufficient across all outcomes because of a lack of clear and consistent finding in more than one study.

Detailed Synthesis

Across the two studies, outcomes were limited to binge eating (one study) and weight/BMI (two studies).

Binge-eating Outcomes

White and colleagues measured LOC eating at baseline, separately considering those experiencing OBEs and SBEs, and followup in both groups after 12 and 24 months (Table 58).[190] The researchers found that both measures of LOC eating before surgery predicted LOC post-surgery in three of four comparisons. More specifically, those experiencing LOC eating by either measures of OBEs or SBEs before surgery were also more likely to report LOC episodes at 12 and 24 months, compared to those who had no episodes before surgery. The probability of LOC episodes increased over time.

Table 58. Course of illness outcomes among bariatric surgery patients: Binge or loss-of-control eating episodes

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
White et al., 2010[190]	12 month LOC, as a function of baseline pre-op LOC OBEs(large episodes)
	12 month LOC among those with objective LOC at baseline: 49.6% (N= 57)
Analyses compare outcomes between those with and without LOC at baseline,	12 month LOC among those with no objective LOC at baseline: 28.1% (N= 47) Difference in LOC episodes at 12 month followup: ($p < 0.001$)
Pre-Op LOC: LOC OBEs: 42% (N= 153)	12 month LOC, as a function of baseline pre-op subjective LOC (small episodes)
LOC SBEs: 40% (N= 145)	12 month LOC among those with subjective LOC at baseline: 47.4% (N= 54)
LOC-general (either OBEs or SBEs: 61% (N= 221)	12 month LOC among those with no subjective LOC at baseline: 29.4% (N= 50) Difference in LOC episodes at 12 month followup: ($p < 0.002$)
No LOC-general (neither OBEs or SBEs): 39% (N= 141)	12 month LOC, as a function of baseline pre-op LOC-general (objective or subjective LOC)
	12 month LOC among those with LOC-general at baseline: 45.3% (N= 77)
	12 month LOC among those with no LOC-general at baseline: 23.0% (N= 36)
Mixed effects regression	Difference in LOC-general episodes at 12 month followup: ($p < 0.001$)
	24 month objective LOC, as a function of baseline pre-op objective LOC (large episodes)
	24 month LOC among those with objective LOC at baseline: 46.2% (N= 36)
	24 month LOC among those with no objective LOC at baseline: 33.7% (N= 30)
	Difference in LOC episodes at 24 month followup: ($p < 0.102$)
	24 month LOC, as a function of baseline pre-op subjective LOC (small episodes)
	24 month LOC among those with subjective LOC at baseline: 52.5% (N= 34)
	24 month LOC among those with no subjective LOC at baseline: 31.4% (N= 32)
	Difference in LOC episodes at 24 month followup: ($p < 0.010$)
	24 month LOC, as a function of baseline pre-op LOC-general (objective or subjective LOC)
	24 month LOC among those with LOC-general at baseline: 49.0% (N= 50)
	24 month LOC among those with no LOC-general at baseline: 24.2% (N= 16)
	Difference in LOC episodes at 24 month followup: ($p < 0.002$)
	Post-op LOC was predicted by pre-op LOC $\beta = 1.43$ ($p=0.0001$) and time $\beta=0.36$ ($p=0.04$)

β = beta coefficient; BMI = body mass index; DSM = Diagnostic and Statistical Manual; G = group; N=number; NR = not reported; OBE = objective binge episodes; SD = standard deviation; SBE = subjective binge episodes

Weight Outcomes

Both studies reported weight outcomes (Table 59). Busetto et al. described outcomes in both those with and those without BED before surgery; they did not record, however, whether differences reached statistical significance.[130] However, based on our review of the article, weight outcomes were similar between the two groups. Likewise, White et al. did not find that preoperative LOC eating behavior was related to post-surgical weight loss.[190] They did determine, however, that post-surgical LOC eating at 12-month followup was related to a lower probability of weight loss and to a greater probability of regaining weight at 24 months (odds ratio [OR], 2.16; 95% CI, 0.995 to 4.687).

Table 59. Binge-eating disorder course of illness outcomes: Weight, body mass index, and other biomarkers

Author, Year Groups (Number analyzed) Analysis Approach	Length of Time Followed Outcomes
Busetto et al., 2005[130]	5 years
G1: LAGB cases with BED before surgery (N= 130) G2: LAGB comparisons without BED (N= 249) Paired t-test and chi-square tests for comparisons across groups	Percentage with excess weight loss (EWL) >50%: G1: 23.1%; G2: 25.7% (p=NR) Percentage with %EWL < 20%: G1: 23.8%; G2: 24.1% (p=NR) Percentage with weight regain (at least 20% of baseline excess weight):G1: 20.8%, G2: 22.5% (p=NR)
White et al., 2010[190]	Weight loss at 12 or 24 months: as predicted by preoperative LOC (P=NS)
Analyses compare groups with and without LOC at various time points Mixed effects regression	Weight loss (BMI) at 24 months: as predicted by LOC at 12 months (P=0.004) LOC at 12 months: 18.3 (5.6); no LOC at 12 months: 21.2 (7.2) (P=0.004) Weight regain from 12-24 months, as predicted by LOC at 12 months OR = 2.16 (95% CI, 0.995 to 4.687) higher odds for those with LOC eating Weight loss at 12 or 24 months: as predicted by preoperative BED (LOC over eating large amounts of food at least twice weekly (P=NS)

BED = binge-eating disorder; BMI = body mass index; G = group; LAGB = laparoscopic adjustable gastric banding; LOC = loss of control; N=number; NR = not reported; SD = standard deviation; SBE = subjective binge episodes

KQ 10: Differences in Course of Illness by Age, Sex, Race, Ethnicity, Sexual Orientation, Initial Body Mass Index, Duration of Illness or Coexisting Conditions

We found no evidence examining differences in the course of illness among bariatric surgery patients based on differences in patient sociodemographic or health characteristics.

Loss-of-Control Eating Among Children

KQ 14: Course of Illness

Description of Studies

The evidence on the course of illness among children with LOC eating consists of three cohort studies reported in seven articles (Table 60). One study reports on 5- and 10-year outcomes from Project EAT (Eating Among Teens and Young Adults), a longitudinal study tracking binge eating, dieting, and weight control behaviors.[191-193] Another set of reports is from the Growing Up Today Study (GUTS), a longitudinal study tracking health in an adolescent cohort that included a subset of participants with LOC and binge eating who were followed for up to 13 years.[194,195] Finally, a German longitudinal study followed a cohort of preadolescent cases with LOC eating at baseline and matched controls for up to 5.5 years.[196,197] In this study, children were matched based on age, sex, percentile of BMI, education (school type and grade), and the mother's years of education.

Table 60. Characteristics of course of illness studies among children with loss-of-control eating

Author, Year Country Design Length of Time Followed Risk of Bias	Research Objective Definition of LOC Eating	Groups (Number Analyzed) Key Population Characteristics at Baseline	Major Outcome Categories Measures Subgroup Analyses and Comparisons (if any)
Eisenberg et al., 2010[191]; Neumark-Sztainer et al., 2011[192]; Goldschmidt et al., 2014[193] US Longitudinal cohort Medium	To examine predictors of continued binge/loss of control eating in adolescent cohort, 5 and 10 years post baseline assessments; outcomes from Project EAT Binge/LOC eating, assessed with 2 questions: "In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge eating)?" "During the times when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating?" Those who indicated feeling LOC were classified as binge eaters.	Cohort of middle school and high school students followed up after 5 & 10 years. G1: Assessed at 5 years: (N= 2,516) G2: Assessed at 10 years: (n = 2,287) G3: Just cohort with binge/LOC eating at 2 consecutive measurements (N=262) Middle school age:32% High school age: 68% Female: 55% Nonwhite: 50% BMI: 22.4 (SD 4.5) Binge/LOC eating: N=323	Binge eating Binge eating/LOC
Hilbert et al., 2013[196]; Hilbert & Brauhardt, 2014[197] Germany Longitudinal case-control Low	To examine the course of loss-of-control eating in preadolescents, approximately 2 and 5.5 years post baseline assessment LOC eating, at least 1 episode (objective and/or subjective) during past 3 months, based on the clinical semistructured eating disorders interview Eating Disorder Examination adapted for Children (ChEDE) The ChEDE was also used to diagnose BED according to the DSM–IV–TR, and partial BED. Partial BED was defined as: having at least 1 episode of LOC eating per week over the previous 3 months; having at least some degree of distress associated with the LOC episodes; and meeting at least 2 or more of the 5 behavioral symptoms.	Cohort of children 8 to 13 year of age, assessed approximately every 6 months for 2 years (t1-t5), and then at approximately 5.5 years (t6) G1: Cases (N=55, data at ≥ 3 of 5 t2-t5 assessments; N=32 t6 assessment) G2: Matched controls (N=57, data at at ≥ 3 of 5 t2-t5 assessments; N=44 t6 assessment) Mean age: 10.7 Female: 60% BMI: 23.99 (SD 5.45).	Binge eating LOC eating, stability, persistence BED, partial BED onset Weight BMI Psychological Depression

Table 60. Characteristics of course of illness studies among children with loss-of-control eating (continued)

Author, Year Country Design Length of Time Followed Risk of Bias	Research Objective Definition of LOC Eating	Groups (Number Analyzed) Key Population Characteristics at Baseline	Major Outcome Categories Measures Subgroup Analyses and Comparisons (if any)
Sonneville et al., 2013[194]; Field et al., 2013[195] US Longitudinal cohort Medium	To examine whether overeating and binge eating are prospectively associated with adverse health outcomes in adolescents; outcomes from GUTS cohort Binge eating assessed with two questions ''In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge eating)?'' ''During the times when you ate this way, did you feel you couldn't stop eating or control what or how much you were eating?'' Those who indicated at least weekly episodes of eating a large amount of food with LOC during the episodes were classified as binge eaters.	Cohort of children 9 to 15 year of age followed up annually for 5 years (1996-2001), then biennially for 8 years (2001-2007) Analysis 1: Boys and girls with 2 consecutive assessments (full cohort all eating classifications N=14,166) Analysis 2: Girls only with 2 consecutive assessments (full cohort all eating classifications N=8,594) Age range: 9-15, mean: 12.0 (1.6) Nonwhite: <10% Overweight or obese: 22%	Weight Incident overweight Psychological and Other Develop high depressive symptoms Start binge drinking frequently Start to use drugs

BED = binge-eating disorder; BMI = body mass index; DSM = Diagnostic and Statistical Manual; G = group; GUTS = Growing Up Today Study; N=number; RoB = risk of bias

Key Points

- Evidence concerning the course of illness among children with LOC eating behavior was obtained from three longitudinal cohort studies. Early adolescent binge or LOC eating predicted similar behavior in later adolescence in two studies (low strength of evidence).
- Evidence of additional outcomes was limited or inconsistent across studies.

Detailed Synthesis

The Project EAT and GUTS studies similarly assessed participant baseline binge or LOC eating, based on two questions (see Table 61). The first question asked children to remember whether, during the previous year, they had engaged in a -binge-eating episode; the followup question asked whether they felt out of control during the episode. The Project EAT study considered participants to have LOC eating if they experienced binge or LOC eating one or more times.[191] The GUTS study was more restrictive and limited the group with binge or LOC eating to those who had experienced LOC eating at least weekly during the past year.[194] In contrast, Hilbert and colleagues used a clinical interview to determine whether children had LOC eating based on whether they had experienced one or more OBE or SBE during the past 3 months.[196]

The age of the children at baseline differed across studies. The Hilbert et al. group was the youngest (8 to 13 years of age), followed by GUTS (9 to 15 years) and then Project EATS (approximately one-third middle school students and two-thirds high school students).

Table 61. Loss-of-control eating in children, course of illness: Binge-eating outcomes

Author, Year Groups (Number Analyzed) Analysis approach	Length of Time Followed Outcomes
Eisenberg et al., 2010[191]; Neumark-Sztainer et al., 2011[192]; Goldschmidt et al., 2014[193] Project EAT G1: Assessed at 5 years (N=2,516), General linear model[191] G2: Assessed at 10 years (N= 2,287) log binomial model[192] G3: LOC cohort only, (N= 232) logistic regression [193] All analyses weighted, controlling for nonresponse weights	5 years & 10 years G1: Probability of binge eating/LOC eating at 5 year followup, based on baseline binge/LOC eating: (adjusting for other baseline characteristics [friends dieting behavior, same sex parent's dieting, race and SES] and current BMI) Females: ($p < 0.001$) Males: ($p < 0.001$) G2: Probability of binge eating/LOC at 10 years followup, based on baseline binge/LOC eating: Younger group mean age at baseline:12.8; Older group mean age at baseline: 15.9 Younger females: RR = 2.21 (95% CI, 1.31 to 3.71) Younger males: RR = 0.47 (95% CI, 0.03 to 7.12) Older females: RR = 2.42 (95% CI, 1.68 to 3.47) Older males: RR = 5.27 (95% CI, 2.68 to 10.34) G3: Change between consecutive assessments (baseline to 5 year, 5 year to 10 year) Binge eating/LOC at baseline, also reported at 5 year followup: 16%; Binge eating/LOC at 5 year followup, also reported at 10 year followup: 42% G3: Odds of binge/LOC eating cessation: (adjusting for baseline value of change variables, age cohort, sex, race/ethnicity, and SES) At 5 year followup, predictor variables, at previous time point BMI: OR, 1.10 (95% CI, 1.00 to 1.21); (p=0.06) Body satisfaction: OR, 1.00 (95% CI, 0.94 to 1.06); (p=0.88) Depression symptoms: OR, 0.96 (95% CI, 0.81 to 1.13); (p=0.58) Self-esteem: OR, 1.04 (95% CI, 0.92 to 1.18); (p=0.52) Change in BMI: OR, 0.93 (95% CI, 0.81 to 1.07); (p=0.31) Change in body satisfaction: OR, 1.01 (95% CI, 0.96 to 1.07); (p=0.68) Change in depression symptoms: OR, 0.89 (95% CI, 0.73 to 1.09); (p=0.28) Change in self-esteem: OR, 1.21 (95% CI, 1.02 to 1.44); (p=0.03) At 10 year followup, predictor variables, at previous time point BMI: OR, 0.95 (95% CI, 0.88 to 1.04); (p=0.26) Body satisfaction: OR, 1.01 (95% CI, 0.95 to 1.06); (p=0.84) Depression symptoms: OR, 0.92 (95% CI, 0.81 to 1.05); (p=0.21) Self-esteem: OR, 1.03 (95% CI, 0.91 to 1.15); (p=0.67)

Table 61. Loss-of-control eating in children, course of illness: Binge-eating outcomes (continued)

Author, Year Groups (Number Analyzed) Analysis approach	Length of Time Followed Outcomes
Eisenberg et al., 2010[191]; Neumark-Sztainer et al., 2011[192]; Goldschmidt et al., 2014[193] (continued)	Change in BMI: OR, 0.98 (95% CI, 0.88 to 1.09); (p=0.70) Change in body satisfaction: OR, 1.06 (1.00 to 1.13); (p=0.05) Change in depression symptoms: OR, 0.81 (0.68 to 0.95); (p=0.009) Change in self-esteem: OR, 1.23 (1.07 to 1.41); (p=0.004)
Hilbert et al., 2013[196]; Hilbert & Brauhardt, 2014[197] G1: Cases (N=55, data at ≥ 3 of 5 t2-t5 assessments; N=32 t6 assessment) G2: Matched controls (N=57, data at ≥ 3 of 5 T2-T5 assessments; N=44 t6 assessment) Multilevel Modeling approach to nonindependence of observations and missing values	Odds of LOC eating at t2 to t5 (6 months to 2 years post baseline) (adjusting for time, child and parental BMI, age, sex, school type, and maternal education) LOC episodes at T1: OR, 3.83 (p=0.002) Odds of LOC eating at t6 (5 years post baseline) (adjusting for time, child and parental BMI, age, sex, school type, and maternal education) G1 vs. G2: OR, NR (p=0.34) Odds of LOC eating at subsequent time point t2 to t5 (6 months to 2 years post baseline) (adjusting for time, child and parental BMI, age, sex, school type, and maternal education LOC at prior assessment: OR, 0.71 (p=0.39) G1 LOC eating pattern over 2 year followup Persistent LOC eating at all five assessments: 3.6%; recurring LOC eating at multiple timepoints: 41.8%, remission post baseline: 54.5%. LOC eating at 5 year followup G1: LOC at T6: 38.3%; Remission post baseline: 61.7% G2: no LOC eating at any assessment: 71.7% Odds of onset of partial or full BED by T6 G1 vs. G2: OR, 1.39, 95% CI[0.19–10.17], p=.74), persistent LOC eating: OR, 11.51, (95% CI,1.28–103.61),(p<0.05) Change in partial BED, over 2 year period (controlling for shape concern, baseline depression, emotional eating, weight-related teasing, age, sex, child BMI) LOC eating as predictor: OR, 1.187 (p < 0.05)

BED = Binge-eating disorder; BMI = body mass index; DSM = Diagnostic and Statistical Manual; EDE = Eating Disorder Examination Interview; FCI = Food Craving Inventory; G = group; LOC = loss of control; mg = milligrams; N=number; NR = not reported; OBE = objective binge episodes; OR = odds ratio; SD = standard deviation; SBE = subjective binge episodes; SM = self-monitoring daily record; T = assessment number; TR = Text Revision; tx = treatment; wks = weeks

Binge-Eating Outcomes

Two of these three studies measured LOC and binge-eating outcomes at followup (Table 74). Both found evidence of persistent LOC eating behavior over time. In the Project EAT study, outcomes for males and females were measured separately; for both, binge or LOC eating behavior at the 5-year followup, was significantly related to these behaviors at baseline. A significantly increased risk remained into young adulthood, as measured by the 10-year followup, for all but the males who were in middle school at the time of the baseline assessment. In the longitudinal case-control study, LOC eating cases at baseline were significantly more likely than controls to be experiencing LOC eating episodes at 6 months to 2 years followup (OR, 3.83). The study did not find that the difference persisted at the 5-year followup. However, onset of partial BED was predicted by significantly greater LOC eating (OR, 1.19) and greater BMI at a preceding assessment (OR, 1.24) over the 2-year followup period.

Greater odds of cessation in LOC eating at 5 years was predicted by improved self-esteem at an earlier assessment (p=0.03) among the LOC eating cohort in the Project EAT study.[193] At 10-year followup, cessation of LOC eating was predicted by improved body satisfaction and self-

esteem at the preceding assessment and was less likely among those with increased depression symptoms at the preceding assessment.

Weight Outcomes

The GUTS study and the German case-control study reported weight outcomes (Table 62). Multivariate analyses in the GUTS study showed that earlier binge eating (compared with no overeating) predicted an increase in the odds of the onset of being overweight or obese, controlling for prior period BMI and other characteristics (OR, 1.73). In an analysis limited to girls, binge eating more than weekly (but not more than monthly) predicted the subsequent onset of being overweight. In contrast, the German study found that change in BMI over time and BMI at 2-year followup were not significantly different between cases and controls.

Table 62. Loss-of-control eating in children, course of illness: Weight outcomes

Author, Year Groups (Number Analyzed) Analysis Approach	Length of Time Followed Outcomes
Sonneville et al., 2013[194]; Field et al., 2013[195] GUTS Analysis 1: Boys and girls with 2 consecutive assessments (full cohort all eating classifications N=14,166) Analysis 2: Girls only with 2 consecutive assessments (full cohort all eating classifications N=8,594) Log-odds of the hazard rate using generalized estimating equations	Change between consecutive assessments Analysis 1: Odds of onset of overweight/obesity (adjusting for sex, age, prior period BMI, and prior period dieting): Binge eating prior assessment (vs. no overeating): OR, 1.73 (1.11-2.69) Overeating prior assessment (vs. no overeating): OR, 1.24 (0.70-2.21) Analysis 2: Odds of onset of overweight (adjusting for age, BMI, dieting) Binge eating ≥ weekly prior assessment (vs. nondisordered eating): OR, 1.90 (1.04–3.48) Binge eating ≥ monthly prior assessment (vs. nondisordered eating): OR, 1.35 (0.98–1.87)
Hilbert et al., 2013[196]; Hilbert & Brauhardt, 2014[197] G1: Cases (N=55, data at ≥ 3 of 5 T2-T5 assessments; N=32 T6 assessment) G2: Matched controls (N=57, data at ≥ 3 of 5 T2-T5 assessments; N=44 T6 assessment) Multilevel Modeling approach to nonindependence of observations and missing values	Change in BMI G1 v G2: (p=0.193); growth pattern did not change over time BMI at T6 G1 v G2: (p=0.30)

BMI = body mass index; DSM = Diagnostic and Statistical Manual; EDE = Eating Disorder Examination Interview; G = group; mg = milligrams; N=number; NR = not reported; OR = odds ratio; SD = standard deviation; T = assessment TR = Text Revision; tx = treatment; wks = weeks

KQ 15: Differences in Course of Illness by Age, Sex, Race, Ethnicity, Sexual Orientation, Initial Body Mass Index, Duration of Illness or Coexisting Conditions

We found no evidence examining differences in the course of illness among children based on differences in sociodemographic or health characteristics.

Discussion

Key Findings and Strength of Evidence

This systematic review for the Agency for Healthcare Research and Quality (AHRQ) addressed the effectiveness and comparative effectiveness of treatments for binge-eating disorder (BED) and for loss-of-control (LOC) eating in bariatric surgery patients and children. BED is characterized by recurrent episodes of binge eating, i.e., eating episodes that occur in a discrete period of time (≤ 2 hours) and involve the consumption of an amount of food that is definitely larger than most people would consume under similar circumstances. Other core features of BED are a sense of lack of control over eating during binge episodes, significant psychological distress (e.g., shame, guilt) about binge eating, and the absence of regular inappropriate compensatory behaviors.

In 2013, BED was labeled a distinct eating disorder in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).[198] Previously (in the DSM-IV), BED had been designated as a provisional diagnosis. In the DSM-5, the binge frequency criterion was reduced from twice per week to once per week and the duration criterion from 6 months to 3 months, bringing the criteria in line with those for bulimia nervosa (BN).

LOC eating is not a formal diagnosis. Rather, it refers to recurrent binge-like eating behavior in individuals in whom diagnosis of threshold BED is challenging, such as bariatric surgery patients and children.

Primary outcomes include episodes of binge eating or LOC eating, measures of eating-related and general psychological problems, weight and other measures of physical health, and quality of life. As a relatively new area of treatment research, potential interventions for LOC eating were unknown but anticipated to be similar to those used to treat BED or other psychological disorders in children.

We evaluated the benefits and harms of treatment approaches for individuals meeting DSM-IV or DSM-5 criteria for BED, for post-bariatric surgery patients with LOC eating and for children with LOC eating. We also compared the relative benefits and harms of these approaches with each other. We had a secondary interest in examining whether treatment effectiveness differed in subgroups based on sex, race, ethnicity, sexual orientation, body mass index (BMI), duration of illness, or coexisting conditions. A third aim of this review was to examine the course of illness of BED and of LOC eating, especially as elements of the natural history of these disorders relate to the primary outcomes.

Overview

The evidence included 48 randomized controlled trials (RCTs) presented in 61 articles, examining treatment outcomes (45 of these trials concerned treatment for patients with BED). We assembled evidence concerning course of illness from 12 observational studies presented in 19 articles. Studies of BED therapies generally focus on pharmacological interventions, psychological and behavioral interventions, or on combinations of two or more approaches. We found no studies meeting inclusion criteria for any complementary and alternative medicine interventions.

We sought to include evidence of differences in treatment outcomes and course of illness for subgroups of individuals with BED and LOC eating, based on the demographic or patient characteristics noted above. We found no evidence to address any of these comparisons for any

of our patient populations. Therefore, the six Key Questions (KQs 3, 5, 8, 10, 13, 15) meant to address these comparisons will not be discussed further.

We limit our discussion to summarizing the strength of evidence for benefits of interventions, comparisons, and outcomes for which we had studies of at least low or medium risk of bias. We included studies with high risk of bias in sensitivity analyses of meta-analysis findings, as evidence of harms, and as sources of information for course of illness (because of the otherwise very limited body of available evidence).

We developed strength of evidence grades from ratings on five domains: study limitations (based on individual study risk of bias), directness of the evidence or the comparisons, consistency, precision of estimates, and reporting bias.[121] We did not evaluate other strength of evidence domains (i.e., magnitude of effect, confounding, and dose-response relationships). Strength of evidence can have one of four grades—high, moderate, low, or insufficient. Insufficient evidence arises when we had no studies addressing the particular topic; when we had only a single small study; when available studies were sufficiently inconsistent, indirect, or imprecise as to preclude drawing any conclusions; or when differences in treatments appear to show no difference among studies that may be underpowered or clinical thresholds for minimal differences have not been established.

Key Question 1. Effectiveness of Treatments or Combinations of Treatments for Binge-Eating Disorder

For this KQ, we sought evidence for the effectiveness of pharmacological treatments, psychological and behavioral treatments, and combinations of pharmacological and psychological and behavioral treatments on a range of clinical outcomes, including frequency of binge eating and abstinence from binge eating, measures of eating-related and general psychological problems, and weight and other measures of physical health. We found data on many different general and eating-related psychological outcomes. A few—namely binge-eating related obsessions and compulsions; dietary and cognitive restraint; eating, shape, and weight concerns; depression; and symptoms of general psychological distress—were fairly consistently reported across studies.

For outcomes of pharmacological treatments, our findings are limited to outcomes at the end of treatment, as no studies followed patients beyond treatment unless to oversee medication taper for a brief period of time. By comparison, patients enrolled in trials of psychological or behavioral treatments tended to undergo assessments beyond the end of treatment, most commonly less than 1 year but in some instances 2 years or more.

Table 63 summarizes the pharmacological interventions on which we had low, moderate, or high strength of evidence for clinical outcomes. We found evidence for the effectiveness of second-generation antidepressants, as a class, based on meta-analyses and for one anticonvulsant medication (topiramate) based on qualitative synthesis.

Table 63. Strength of evidence for pharmacological interventions to improve outcomes in binge-eating disorder

Intervention and Comparator	Number of Studies (Sample Sizes)	Outcome and Results	Strength of Evidence
Second-generation Antidepressants versus Placebo	MA of 8 RCTs (N=416)	Antidepressants increased binge abstinence: OR, 2.15 (95% CI, 1.40 to 3.31, p=0.001)	High for benefit
	MA of 7 RCTs (N=331)	Antidepressants decreased the frequency of binge episodes: SMD, −0.37 (95% CI, −0.58 to −0.15, p=0.001)	High for benefit
	MA of 3 RCTs (N=122)	Antidepressants decreased the frequency of binge days: SMD, −0.57 (95% CI, −0.93 to −0.21, p<0.001)	Low for benefit
	MA of 3 RCTs (N=122)	Antidepressants decreased eating-related obsessions and compulsions: SMD, −0.58 (95% CI, −0.99 to −0.17, p=0.006)	Low for benefit
	MA of 4 RCTs (N=182)	Antidepressants decreased weight: SMD, −0.41 (95% CI, −0.74 to −0.07, p=0.017)	Low for benefit
	MA of 6 RCTs (N=297)	No difference in BMI: SMD, −0.15 (95% CI, −0.38 to 0.08, p=0.194)	Low for no difference
	MA of 3 RCTs (N=142)	Antidepressants decreased symptoms of depression: SMD, −0.58 (95% CI, −0.92 to −0.24, p=0.001)	Low for benefit
Topiramate versus Placebo	2 RCTs (N=468)	Topiramate increased binge abstinence	Moderate for benefit
	2 RCTs (N=468)	Topiramate decreased the frequency of binge episodes	Moderate for benefit
	2 RCTs (N=468)	Topiramate decreased eating-related obsessions and compulsions	Moderate for benefit
	2 RCTs (N=468)	Topiramate decreased weight	Moderate for benefit
	1 RCT (N=407)	Topiramate improved general and eating-related psychological functioning indicated by increases in cognitive control of eating and decreases in symptoms of psychological distress, susceptibility to hunger, and disinhibition of control over eating	Low for benefit
	1 RCT (N=407)	Topiramate decreased impulsivity	Low for benefit
	1 RCT (N=407)	Topiramate decreased disability in family and social domains	Low for benefit

BMI = body mass index; CI = confidence interval; GI = gastrointestinal; MA = meta-analysis; N = number; OR = odds ratio; RCT = randomized controlled trial; SMD = standardized mean difference; SNS = sympathetic nervous system

Evidence concerning the efficacy of antidepressants in treating patients with BED was limited to data gathered at the end of treatment and differed by outcome. Antidepressants reduced the weekly frequency of binge-eating episodes and binge-eating days, and they were more than twice as likely as placebo to help patients achieve abstinence from binge eating (high strength of evidence). However, the magnitude of the differences between antidepressants and placebo was modest (approximately one-third of a binge episode less per week and approximately one-half of a binge day less per week in those receiving antidepressants). In addition, many patients did not achieve abstinence with antidepressants (range across 8 trials, 46% to 78%).

We also examined whether antidepressants were effective in treating psychological aspects and correlates of BED. The volume of evidence for these benefits was less than for binge-eating behavior and, overall, the strength of evidence for benefit was low. Antidepressants helped reduce binge-eating-related obsessive thoughts and compulsions. That is, they provided some benefit in reducing the time that patients spend thinking about food, the degree to which they feel compelled to binge eat, the effort they exert to resist doing so, and the degree of distress associated with these mental processes. Before treatment, patients reported their severity of

obsessions and compulsions was approximately 20 on a 40-point scale. Collectively, obsessions and compulsions decreased approximately one-half scale point more with antidepressant treatment than placebo. We also found evidence of modest improvements in symptoms of depression as measured on the 52-point Hamilton Depression Rating Scale (HAM-D). Before treatment, patients reported relatively mild symptom levels (mean less than 6 across studies). After treatment, those who received antidepressants experienced approximately a one-half point greater reduction in their HAM-D score than those who received placebo.

We found fairly consistent evidence that overweight and obese patients treated with antidepressants lost more weight during treatment than those who did not receive an antidepressant (low strength of evidence). The difference between groups in weight loss was approximately 1.7 pounds. Of note, this difference in weight outcome was the net effect of relatively small decreases in those treated with antidepressants (three of four trials) coupled with small increases in those treated with placebo (three of four trials). Given the overall limited impact on weight and the short duration of treatment (6 to 12 weeks), finding no difference in the change in BMI at the end of treatment between those who received antidepressants and those who received placebo is not surprising.

Evidence was insufficient to demonstrate the effectiveness or comparative effectiveness of specific second-generation antidepressants in the treatment of BED. The main reason was that each medication was studied in a single, small sample size trial or, at most, in two trials that differed on key parameters such as doses or treatment duration.

Like antidepressants, the evidence concerning the efficacy of other medications in the treatment of BED was limited to data obtained at the end of treatment. Topiramate (an anticonvulsant) reduced the frequency of binge eating by approximately one binge day per week more than placebo, and it helped approximately 30 percent more patients achieve abstinence from binge eating (moderate strength of evidence). In addition, topiramate helped reduce binge-eating-related obsessive thoughts and compulsions by approximately 30 percent and more general psychological distress symptoms by approximately 23 percent more than placebo (moderate strength of evidence). Among overweight and obese patients, those treated with topiramate lost, on average, approximately 10 pounds more (equivalent to ~4 percent more total body weight) than those who received placebo (moderate strength of evidence). Topiramate had additional benefits including reductions in patients' susceptibility to hunger as a trigger for binge eating and improvements in their general tendency to act less impulsively. Patients treated with topiramate also tended to experience increased sense of cognitive control over their binge eating and decreased disruptions in their social and family life compared with patients who received placebo. However, the strength of evidence for these benefits was low.

Evidence was insufficient for benefits of other medications, including dietary supplements. Each medication that we identified in our literature searches was studied in only one small trial.

Table 64 summarizes the psychological and behavioral interventions for which we had low, moderate, or high strength of evidence for treatment benefits. These included three forms of cognitive behavioral therapy (CBT) – therapist-led CBT, partially therapist-led CBT, and structured self-help CBT – that represent variations of therapist involvement and contact during the intervention in descending order of therapist participation. We also evaluated evidence on the comparative effectiveness of different forms of CBT and the comparative effectiveness of CBT versus behavioral weight loss. We found evidence for all outcomes at the end of treatment and for some outcomes over periods as long as 6 years after treatment ended.

Table 64. Strength of evidence for psychological/behavioral interventions to improve outcomes in binge-eating disorder

Intervention and Comparator	Number of Studies (Sample Sizes)	Outcome and Results	Strength of Evidence
Therapist-led CBT versus Waitlist	5 RCTs (N=344)	CBT decreased binge frequency	High for benefit
	4 RCTs (N=298)	CBT increased binge abstinence	High for benefit
	5 RCTs (N=344)	CBT decreased eating-related psychopathology	High for benefit
	5 RCTs (N=344)	No difference for BMI	Moderate for no difference
	5 RCTs (N=344)	No difference for depression	Moderate for no difference
Partially Therapist-led CBT versus Waitlist	2 RCTs (N=162)	CBT decreased binge frequency	Low for benefit
	2 RCTs (N=162)	CBT increased binge abstinence	Low for benefit
	2 RCTs (N=162)	No difference for BMI	Low for no difference
	2 RCTs (N=162)	No difference for depression	Low for no difference
Structured Self-help CBT versus Waitlist	2 RCTs (N=162)	CBT decreased binge frequency	Low for benefit
	2 RCTs (N=162)	No difference for BMI	Low for no difference
	2 RCTs (N=162)	No difference for depression	Low for no difference
Therapist-led versus Partially Therapist-led CBT	3 RCTs (N=193)	No difference in binge frequency or abstinence	Low for no difference
	3 RCTs (N=193)	No difference in eating-related psychopathology	Low for no difference
	3 RCTs (N=193)	No difference in BMI	Low for no difference
	3 RCTs (N=193)	No difference in symptoms of depression	Low for no difference
Therapist-led versus Structured Self-help CBT	3 RCTs (N=199)	No difference in eating-related psychopathology	Low for no difference
	3 RCTs (N=199)	No difference in BMI	Low for no difference
	3 RCTs (N=199)	No difference in symptoms of depression	Low for no difference
Partially Therapist-led versus Structured Self-help CBT	3 RCTs (N=198)	No difference in binge frequency or abstinence	Low for no difference
	3 RCTs (N=198)	No difference in eating-related psychopathology	Low for no difference
	3 RCTs (N=198)	No difference in BMI	Low for no difference
	3 RCTs (N=198)	No difference in symptoms of depression	Low for no difference
Therapist-led CBT versus BWL	2 RCTs (N=170)	CBT decreased binge frequency more than BWL at end of treatment	Low for CBT benefit
	2 RCTs (N=170)	No difference in eating-related psychopathology	Low for no difference
	2 RCTs (N=170)	BWL decreased BMI more than CBT at end of treatment	Moderate for benefit
	2 RCTs (N=170)	No difference in symptoms of depression	Low for no difference

BMI = body mass index; BWL = behavioral weight loss; CBT = cognitive-behavioral therapy; N = number; RCT = randomized controlled trial

We found strong evidence that CBT reduced binge frequency and helped patients achieve abstinence. These benefits were apparent for all three forms of CBT (therapist-led, high strength of evidence; partially therapist-led and structured self-help CBT, low strength of evidence). In relation to reducing general and eating-related psychological symptoms, only therapist-led CBT was superior to waitlist in reducing patients' susceptibility to hunger and eating concerns and in improving their sense of control over eating (high strength of evidence). Across the various forms of CBT, treatment was generally no better than waitlist for reducing weight or symptoms of depression (low strength of evidence). We found very limited data comparing other forms of self-help CBT, such as guided or pure self-help (which have incrementally less involvement of treatment facilitators than structured self-help), with waitlist; thus, we cannot comment on outcomes of those interventions.

Collectively, this body of evidence suggests that CBT helps patients with BED make improvements in several key behavioral and eating-specific psychological domains. Based on a sufficiently large number of participants (N=344) who participated in studies across several different sites, the evidence for the benefits of therapist-led CBT was especially compelling. Yet, enough variability existed in detailed elements of therapist-led CBT trials, in terms of both the CBT and the comparator arms, to dissuade us from combining them for a meta-analysis.

Consequently, therapist-led CBT is apparently a valid treatment choice for managing BED-specific pathology, namely binge eating and eating-related psychopathology.

We found evidence of the comparative effectiveness of three different forms of CBT: therapist-led CBT, partially therapist-led CBT, and structured self-help CBT. These comparisons are of interest as they provide insight about relative importance of therapist involvement in the effectiveness of CBT. Across comparisons, we found no differences in binge-eating outcomes with the lone exception of one trial that suggested more favorable reduction in binge eating in patients who received therapist-led CBT than patients who received structured self-help CBT (low strength of evidence). Likewise, we found that non-BED-specific outcomes did not differ across comparisons: neither BMI outcomes (moderate strength of evidence) nor depression outcomes (moderate strength of evidence) differed across comparisons of variations in therapist involvement in CBT interventions. These findings may have implications for decisionmakers who are considering the resources needed for therapist-led compared with other less therapist-intensive forms of CBT in the broader community setting.

We compared CBT, in various forms, with behavioral weight loss (BWL) treatment on outcomes assessed at the end of treatment and, in limited studies, for up to 6 years after treatment ended. We found mixed results in binge-eating and weight outcomes in relation to different forms of CBT and at different assessment time points. CBT was superior to BWL for decreasing binge frequency in the short term (low strength of evidence). Although based on more limited evidence, CBT also appeared to produce more favorable binge-eating outcomesin terms of helping patients maintain lower levels of binge eating and to achieve abstinence over the longer term. Across comparisons, CBT did not appear to have a clear advantage over BWL for helping patients achieve abstinence; however, two trials that followed patients for 2 years or more suggested more favorable abstinence outcomes in those who received CBT (collapsing across time, low strength of evidence for no difference in abstinence).

In contrast to our findings favoring CBT over BWL for short term (and possibly longer term) binge outcomes, we found that patients who received BWL lost more weight during treatment but tended to regain the weight they had lost during treatment; moreover, importantly, they experienced less improvement in binge-eating outcomes over time. Binge-eating outcomes did not differ between patients who received guided self-help CBT and those who received BWL treatment.

Data were very limited about the effectiveness or comparative effectiveness of other forms of CBT such as guided self-help CBT and pure self-help CBT. Similarly, few data were available about the effectiveness or comparative effectiveness of alternate therapies such as interpersonal psychotherapy, dialectical behavior therapy, and dietary approaches other than BWL therapy. Finally, we found only very limited evidence about the effectiveness of cognitive and behavioral treatments that are provided as adjunct therapy to existing hospital-based inpatient treatment for BED.

The primary limitation was the availability of only single trials for specific treatments. Secondarily, similar trials reported disparate outcome measures. For example, one trial reported binge eating and the other trial of a similar type reported only binge abstinence as an outcome. Thus, we are unable to comment on outcomes of these other treatment modalities.

We searched for evidence for combinations of treatments. This exercise led us to several treatment comparisons involving combinations of medications with psychological or behavioral treatments and comparisons involving combinations of psychological or behavioral treatments with other treatments in this category. Some data on multi-component therapies (more than two

treatments bundled together) were also available. However, each variation of combination therapy was evaluated in only a single study with inadequate sample size. These limitations rendered strength of evidence as insufficient for all outcomes. Thus, we are unable to comment on benefits of combination treatments.

In summary, our review suggests three major points.

- First, second-generation antidepressants, as a class, are superior to placebo for the treatment of BED-specific and related clinical outcomes. However, the magnitudes of the benefits appear to be quite modest, as many patients did not achieve abstinence from binge eating and binge frequency was reduced by only one-third of a binge episode per week. Lacking in the available evidence is sufficient information to reach conclusions about the efficacy of any *specific* antidepressant for treating patients with BED.
- Second, topiramate is superior to placebo for improving a range of key psychological, behavioral, and physical health outcomes.
- Third, although BWL helps overweight and obese patients lose weight, it is less effective than CBT for helping patients reach and maintain a lower frequency of binge eating and abstinence over the longer term, after active treatment with face-to-face therapist contact ends.

Key Question 2. Evidence for Harms Associated With Treatments for Binge-Eating Disorder

We sought evidence of the potential harms or side effects that may occur with various treatment options. We anticipated finding some concerns because those are already well known in association with antidepressants, anticonvulsants, and other medications. We also considered any others that authors of these trials might have reported. Table 65 summarizes the interventions for which we had low, moderate, or high strength of evidence for harms outcomes.

Table 65. Strength of evidence for psychological or behavioral interventions to improve outcomes in binge-eating disorder

Intervention and Comparator	Number of Studies (Sample Sizes, Number for Reported Events)	Outcome and Results	Strength of Evidence
Topiramate versus Placebo	2 RCTs (N=468, 83)	Topiramate higher number of events related to gastrointestinal upset	Low for harm
	2 RCTs (N=468, 240)	Topiramate higher number of events related to sympathetic nervous system arousal	Moderate for harm
	2 RCTs (N=468, 89)	Topiramate higher number of events related to sleep disturbance	Low for harm
	2 RCTs (N=468, 73)	Topiramate higher number of headaches	Low for harm
	2 RCTs (N=468, 179)	Topiramate higher number of other[a] events	Moderate for harm
Fluvoxamine versus Placebo	2 RCTs (N=105, 51)	Fluvoxamine higher number of events related to gastrointestinal upset	Low for harm
	2 RCTs (N=105, 123)	Fluvoxamine higher number of events related to sleep disturbance	Low for harm

[a] Includes bone fracture resulting from accidental injury, confusion, depression, eructation, hypertension (high blood pressure), language problems, rash or itching, respiratory illness, rhinitis, sinusitis, taste aversion, urinary hesitancy, others

N = number; RCT = randomized controlled trial

Consistent evidence showed that symptoms of sympathetic nervous system arousal were more common among patients who received topiramate than those who received placebo (moderate strength of evidence). For example, patients who received topiramate more frequently reported sweating, dry mouth, rapid heart rate and similar physical side effects that are associated with anticonvulsant medications than patients who received placebo. Those treated with topiramate also reported a higher number of events, some relating to physical functioning and some to psychological or cognitive functioning. For example, patients who received topiramate reported more nausea and vomiting (gastrointestinal [GI] upset), headaches, and sleep disturbances (low strength of evidence) as well as a collection of other symptoms including rash, high blood pressure, confusion, and taste aversion (moderate strength of evidence for collection of other events) than patients who received placebo. Similarly, patients treated with fluvoxamine reported symptoms of GI upset and sleep disturbances more frequently than patients who received placebo.

Evidence was insufficient for many of the specific types of events, the main reasons were that investigators were inconsistent in how they reported specific events across studies and often did not report events in an itemized fashion with clear attribution to treatment or placebo. These shortcomings in the body of evidence also limited our determination of whether patients receiving medication or combination treatments were more likely to discontinue treatment because of adverse events than those receiving placebo.

Thus, we could address harms only in a descriptive manner, providing counts across categories of events with little assurance that those counts truly represented all adverse events that occurred in the included studies. Similarly, we could only summarize and describe the discontinuations attributed to serious harms and treatment differences in serious harms because so few serious adverse events were reported (N=10).

Key Question 4. Course of Illness Among Individuals With Binge-Eating Disorder

We sought evidence on outcomes among individuals with BED 1 year or longer following their diagnosis (KQ 4). We identified seven studies (trials or observational studies). None of the studies included cohorts of individuals identified in the community; rather they were limited to individuals who had earlier participated in BED treatment studies. One study used a case series design, comparing outcomes in a treatment population with those in matched controls identified through a registry. Because the number of available studies was limited, we included three articles (reporting on two studies) that we had rated high risk of bias.

Binge outcomes were commonly reported in these studies. However, studies differed in the characteristics that investigators hypothesized might be related to better outcomes; these variables included more rapid response to treatment, improvement in eating-related psychopathology, and improvement in non-eating-related psychopathology. One study found increased odds of miscarriage among women with BED. A review article of three studies found no evidence of increased risk of suicide among BED patients 5 years after treatment. (Strength of evidence was insufficient for all comparisons and outcomes.)

Key Questions 6, 7, 11 and 12. Effectiveness of Treatments and Harms Associated With Treatments for Loss-of-Control Eating

We sought evidence of the effectiveness of treatments or combinations of treatment for LOC eating among bariatric surgery patients and children. We found no evidence addressing treatment for LOC eating among bariatric surgery patients (KQs 6, and 7; insufficient strength of evidence).

Evidence about treating LOC eating among children was limited to three small studies (KQ 11). Two studies focused on adolescents and a third on children 8 to 12 years of age. Studies differed in the criteria they used for defining LOC eating and in treatment comparisons. Evidence is thus insufficient for all outcomes. No harms were from treatment were reported in these studies (KQ 12).

Key Question 9. Course of Illness Among Bariatric Surgery Patients With Loss-of-Control Eating

We sought evidence on outcomes among bariatric surgery patients with LOC eating, 1 year or longer following diagnosis. The two identified studies differed in the criteria used for defining LOC eating at baseline (i.e., before surgery). Strength of evidence is insufficient across all outcomes because of a lack of clear and consistent findings in more than one study.

Key Question 14. Course of Illness Among Children With Loss-of-Control Eating

We sought evidence on outcomes among children with LOC eating and identified three longitudinal cohort studies. Early adolescent binge or LOC eating predicted similar behavior in later adolescence (low strength of evidence). Evidence of additional outcomes was limited or inconsistent across studies.

Findings in Relation to What Is Already Known

Our 2006 review, *Management of Eating Disorders*[97,111,114] included evidence on treatment and course of illness for BED. Based on our qualitative analysis of eight RCTs, we had concluded that medications were related to improved clinical outcomes. Two subsequent meta-analyses reached a similar conclusion. Stefano et al.[109 176] included seven (of our eight) RCTs and focused specifically on antidepressant medications; Reas et al.[95] included six of those RCTs and two new trials of selective serotonin reuptake inhibitors (SSRIs) and focused specifically on SSRIs. Those studies estimated similar effect sizes for abstinence (relative risk [RR] of non-abstinence from binge eating: 0.77 and 0.81) but reached different conclusions about weight and depression outcomes.

The Reas et al. meta-analysis also estimated an effect size for non-abstinence (RR, 0.63) and weight (SMD, −4.58) of anticonvulsant medications, based on three RCTs; however, we rated one of the RCTs in their analysis[122 224] as high risk of bias. For the current review, we excluded two of the eight RCTs from our earlier review (one newly rated as high risk of bias and one because it used a medication no longer available in the United States), and we included two newer antidepressant trials[90,132] and one anticonvulsant trial[135] not included in either the 2008 or the 2009 meta-analyses.

Based on this additional evidence, we have confirmed our earlier conclusion regarding the effectiveness of antidepressants for binge abstinence and binge frequency. We have also provided new findings regarding the effectiveness of antidepressants for eating-related obsessions and compulsions, weight, and depression outcomes. In the current review, we included one additional anticonvulsant RCT but were not able to add new information regarding effect size for anticonvulsant medications because of high heterogeneity.

In relation to course of illness of BED, our earlier review had identified only three studies. Although the size of the evidence base is larger for this review, the new studies provide little additional insight. They are mostly case series designs without comparisons or controls for potential confounding factors associated with outcomes, and they are limited to patients followed after treatment.

Our review is the only one that we have identified that has summarized the evidence on treatment and course of illness among individuals with LOC eating.

Implications for Clinical and Policy Decisionmaking

We had hoped to be able to comment on the effectiveness and harms of specific pharmacological and psychological or behavioral treatments for BED and on the comparative effectiveness of specific treatments for BED. For several key outcomes, we found clear evidence of modest sized benefit with antidepressants, as a class, and we were able to confirm previous observations of benefit with topiramate. However, because of insufficient evidence, we could not comment on the effectiveness of any other specific medication. We also found strong evidence of benefit with therapist-led CBT for several key outcomes as well as moderate evidence for benefit with partially-led therapist CBT and structured self-help for a smaller number of outcomes. However, because of insufficient evidence, we could not comment on the effectiveness of other psychological or behavioral treatments or on any combinations of treatments for BED. We found evidence of commonly known side effects with topiramate and fluvoxamine; however, harms of psychological and behavioral treatments were rarely reported. Therefore, based on the available evidence for both benefits and harms, clinicians may find antidepressants, topiramate, and CBT to be good choices for the treatment of BED. However, the comparative effectiveness of these and other treatments remains unclear and constitutes an area in need of further study. Head-to-head trials are needed to help decisionmakers identify best options for first-line and adjunct treatments, including trials that compare the effectiveness of different antidepressants, of antidepressants with other medications and with CBT, and of different modes of delivery of CBT. In particular, comparing different modes of delivery of CBT could be helpful to those making decisions that affect patient access to specialized treatment.

We wanted to comment on the potential impact of the DSM-5 change in the diagnostic criteria for BED. The binge frequency criterion has been lessened and duration of the illness has been shortened. Clinicians, patients, and policymakers might have considerable interest in knowing whether effective treatment options may differ in this newly included group of patients. Unfortunately, we found no studies that provided separate results for a patient population diagnosed according to DSM-5.

We also sought to provide useful evidence concerning effective treatments for individuals with LOC eating. RCTs of bariatric surgery patients with BED before surgery or with LOC eating before or after surgery have not been performed (or at least published).

Applicability

During our review process, we systematically abstracted key factors that may affect the applicability of the evidence base. We identified these key factors a priori. We defined applicability according to AHRQ guidance: "the extent to which the effects observed in published studies are likely to reflect the expected results when a specific intervention is applied to the population of interest under real-world conditions."[199]

Population

Findings about all interventions are likely to be applicable to all adults above the age of 18 with BED. However, because of insufficient evidence, we cannot comment on treatment applicability as it pertains to specific subgroups of adults. Also unclear is whether our findings are applicable to persons with BED who are younger than 18 years of age.

The evidence base concerning treatment for LOC eating in children was small and for bariatric surgery patients was nonexistent. The criteria used to define the condition varied across the studies of children. Thus, although the evidence may be generally applicable, the appropriate diagnostic criterion to use to identify LOC eating has not been established.

Interventions and Comparators

We present evidence on treatments for BED, as long as those treatments were evaluated in studies that met our inclusion criteria and were not considered high risk of bias. We present evidence on medications, psychological and behavioral treatments, and combinations of treatments. No medications in our review are approved by the U.S. Food and Drug Administration for treating BED; in fact, in the United States, no medications have approval for treating BED patients.

We found many single studies of treatments. Although we included these investigations in our review, we could not comment on the efficacy of the many interventions for BED patients. These included medications from many classes that are approved for treating depression, attention deficit hyperactivity disorder, and substance dependence. In addition, we had planned to include complementary and alternative medicine approaches, but we could not find any studies that met our criteria. Thus, we have no evidence regarding the effectiveness of these particular treatments.

Outcomes

We did not limit the outcomes of interest but rather took a broad view of the kinds of benefits that might occur with treatments. Our primary focus was on reductions in commonly noted BED symptomatology, including binge frequency, eating-related obsessions and compulsions, restraint, shape and weight concerns, weight, and depression. However, we sought but did not find sufficient information to make any conclusions about treatment effectiveness for more global measures such as quality of life or lost productivity. We also found no evidence about treatment effectiveness as it relates to final health outcomes such as, for example, diabetes, gastric reflux, and irritable bowel syndrome.

Time Frames

Studies varied in their length of followup periods. All trials of medications measured outcomes at the end of treatment but only two[177,200] reported longer-term followup. Psychological or behavioral intervention outcomes were more likely to include both short- and long-term followup; one trial extending to 6 years after the end of treatment.

Limitations of the Review Process

For this review, we excluded non–English-language studies based largely on limitations of time and resources. However, we examined English language abstracts of non-English language studies to assess the potential size of the literature that would be missed through this approach. We conducted this exercise by repeating our same literature search but limiting it to non-English language studies.

We identified 358 records of non-English language studies matching our search and reviewed the English language abstracts. Of those, we identified only nine references that had potential to be useful in this review; however, several provided vague abstracts, which made it hard to determine any details about the article. One specific article was a systematic review of exercise as a treatment for BED[201] and may have provided useful information for the review. Therefore, we believe that limiting our review to English-language studies had little effect.

Limitations of the Evidence Base

For nearly all medications, many psychological or behavioral studies, and all combination treatment studies, the evidence base was limited to single studies. In particular, for the meta-analyses we performed, the evidence base was limited for certain outcomes for various reasons: (1) authors of different studies did not always report the same outcomes; (2) authors reported statistical outcomes but did not provide descriptive data either in text or to us directly despite our outreach efforts; or (3) in the case of anticonvulsants, too few studies were available. The evidence base for LOC eating in children and post-bariatric surgery patients was extremely limited in scope and volume. The evidence for harms was limited because adverse events, serious adverse events, and study discontinuations clearly attributable to adverse events were not uniformly collected or reported in studies. Although we did not limit our searches based on geographic region or setting, the vast majority of studies were conducted in a clinical setting in North America (United States mainly, or Canada); a few were done in Scandinavia or elsewhere in Europe.

Research Gaps

Gaps in Subgroups Studied

We found no studies that addressed differences in treatment outcomes among important subgroups defined by age, sex, race, and other relevant patient characteristics. Observational and cross-sectional studies have shown that binge eating may be more common among certain racial minorities, for example, yet treatment studies have failed to address whether outcomes differ between groups defined by race. These gaps limit applicability to these important groups.

Secondary analyses of data from treatment studies have shed some light on factors that may be important for future consideration, including age and sex. Nevertheless, the specific analyses

that were conducted did not address whether treatment effectiveness was the same, or different, in these subgroups. Despite the high comorbidity between BED and depression and between BED and obesity, no studies specifically compared outcomes in groups of patients defined either by baseline level of depression or by baseline weight status. In light of growing awareness of LOC eating in children and concerns that LOC eating has negative health effects and predisposes to BED later in life, treatment studies focusing on children are needed.

Gaps in Outcomes Measured (Benefits or Harms)

The evidence base was deficient for outcomes related to social and occupational functioning and final health outcomes such as glucose intolerance or dysregulation that may predispose patients to diabetes and other chronic conditions. Also lacking is evidence of harms associated with psychological or behavioral treatments. A third critical gap exists in longer-term benefits and harms; this gap is especially evident for pharmacological treatments and combination treatments.

Gaps in Interventions

We found strong evidence that CBT is beneficial for patients with BED; however, that conclusion was limited largely to therapist-led CBT because of insufficient information regarding other CBT formats. At present, the body of evidence for CBT constitutes a collection of disparate studies testing variations in format; furthermore, the rationale for comparing different formats is not consistently grounded in an a priori mechanism of action.

The number of therapists with expertise in CBT for BED is limited. This limitation poses a challenge for implementation of our findings. One useful step might be to compare directly (in adequately powered head-to-head trials) whether therapist-led CBT is superior to other CBT formats. If modified versions that require less therapist involvement can be shown to be equally effective as therapist-led CBT, such information could help make CBT more scalable than it has been to this point and guide the next generation of studies that are needed to move the field closer to an individualized approach to treatment. Those future studies should consider other psychological or behavioral interventions that have shown promise (interpersonal psychotherapy; dialectical behavioral therapy), and they should be adequately powered to test for differences in outcomes across key subgroups (i.e., patient groups defined by age, sex, race, and weight status) for which a dearth of information still exists.

We found that antidepressants were beneficial in reducing symptoms of depression and that topiramate was beneficial for reducing symptoms of impulsivity. A head-to-head comparison of the effectiveness of these two treatment options on mood and impulse regulation outcomes would be useful for helping clinicians and patients make first-line pharmacotherapy treatment choices based on individual patients' needs and preferences. Despite current interest in complementary and alternative medicine, neutraceuticals, and mindfulness-based interventions for regulating appetite, eating behavior, and weight, the literature is deficient regarding these types of interventions for BED. We searched clinical trial registries to determine whether additional evidence was available from newly completed, but yet unpublished, studies and for evidence of studies that were selectively withheld from publication because of unfavorable outcomes (possible publication bias).

We found reports of several related RCTs (Phase 2 and Phase 3) of lisdexamfetamine dimesylate (Vyvanse), a medication for attention deficit hyperactivity disorder (ADHD), being conducted by McElroy and colleagues.[202] The investigators recently completed a phase 3

efficacy trial (N=390); we will seek to obtain results of this study during the peer review period. This trial is particularly noteworthy because it will expand significantly our current evidence base (consisting of a single high-risk-of bias study of atomoxetine[91]) pertaining to the efficacy of ADHD medication among individuals with BED. We did not find evidence in the databases reporting on clinical trials to cause us to suspect publication bias in this field of research.

Deficiencies in Methods

Our 2006 review, *Management of Eating Disorders*[97,111,114] identified several methodological issues within the BED treatment literature and recommended changes for future studies. Some but not all of the deficiencies we noted in 2006 persist, including inadequate reporting of randomization and allocation concealment and insufficient attention to treatment group differences in the use of co-interventions. These and other factors led us to increase our risk of bias ratings for some studies and, in turn, reduced the strength of the evidence for the current review. In our 2006 review, we also highlighted several critical needs for advancing the field; these included replication studies, longer-term followup studies, and streamlining and standardizing the outcome measures to eliminate reporting of false discoveries. Unfortunately, with few exceptions,[65,66,93,134] replication studies do not exist, and the evidence base remains insufficient to address whether gains achieved during short-term treatment persist after treatment ends. This gap is especially critical for pharmacological treatments, as patients and their providers seek to understand the need for on-going medical management to maintain treatment gains.

The field would benefit from the development of universally accepted definitions of remission and recovery.[203] To reach this goal, longer-term followup periods with periodic re-evaluation of a core set of psychological, behavioral, and physiological outcomes are needed. Toward this goal, we make two recommendations. First, studies should implement a minimum one-year followup period. Second, future studies should include a reasonably limited set of eating specific (EDE-Q, TFEQ, and YBOCS-BE) and general psychological symptom (depression, anxiety) self-report instruments and report only on findings for which adequate statistical rigor is evident (i.e., control for multiple comparisons). Binge-eating specific adaptations of existing valid instruments[90] may be useful to help move the field closer to an understanding of the core determinants of recovery and relapse, but only if they are clearly described so that others can replicate their use. Consistent and thorough (e.g., fully descriptive data at each major assessment timepoint) reporting of these outcomes will help improve calibration of these instruments against each other, which is ultimately needed for future efforts to use meta-analysis to evaluate treatment effect size. Further, we recommend that studies continue to measure and report binge frequency as both discrete binge episodes and binge days per week, as more data are needed to resolve whether one is the better choice for assessing treatment effects.

Conclusions

Overall, we found the body of evidence was small and either uneven across treatment types and comparisons or, in some areas of interest, nonexistent. Therefore, we were unable to draw conclusions regarding the effectiveness or comparative effectiveness of *specific* interventions or combinations of interventions.

Our meta-analyses, however, provided strong and consistent evidence that second-generation antidepressants, as a class, increased the odds of achieving abstinence and of decreasing binge

frequency, eating-related obsessions and compulsions, weight, and symptoms of depression. Our qualitative assessments provided support for topiramate and therapist-led CBT for the treatment of BED, as well. Topiramate appears to be beneficial for decreasing binge eating frequency, eating-related obsessions and compulsions, and weight; therapist-led CBT is especially beneficial for reducing binge frequency, achieving abstinence, and improving eating-related psychological features of BED.

Additional adequately powered multi-site RCTs are needed to replicate encouraging findings observed to date only in single trials. Investigators also need to increase their sample sizes upon which they base conclusions about treatment effectiveness and comparative effectiveness.

The possible course of illness of LOC eating in children has been studied in three well-designed cohort studies that followed children through adolescence and into adulthood. Of particular concern in these studies is examining the important clinical and policy aspects of the role of early LOC eating on future risk of obesity and BED. The strength of conclusions that we could draw were, however, limited by the fact that the definition of LOC eating differed across studies.

Several studies considered the relative role and importance of objective binge episodes (eating unusually large amounts of food while experiencing a subjective sense of loss of control) and subjective binge episodes (experiencing a sense of loss of control while eating small or normal amounts of food). Distinguishing between these two constructs may be an important step for improving clinical understanding of the course of illness, particularly for bariatric surgery patients.

References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed., Arlington, VA: American Psychiatric Publishing; 2013.

2. Trace SE, Thornton LM, Root TL, et al. Effects of reducing the frequency and duration criteria for binge eating on lifetime prevalence of bulimia nervosa and binge eating disorder: Implications for DSM-5. Int J Eat Disord. 2012;45(4):531-6. PMID: 74089564.

3. Marek RJ, Ben-Porath YS, Ashton K, et al. Impact of using DSM-5 criteria for diagnosing binge eating disorder in bariatric surgery candidates: Change in prevalence rate, demographic characteristics, and scores on the minnesota multiphasic personality inventory - 2 restructured form (MMPI-2-RF). Int J Eat Disord. 2014 Jul;47(5):553-7. Epub: 2014/03/07. PMID: 24599797.

4. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Fourth ed., Washington, DC: American Psychiatric Publishing; 1994.

5. Hudson JI, Hiripi E, Pope HG, Jr., et al. The prevalence and correlates of eating disorders in the National Comorbidity Survey Replication. Biol Psychiatry. 2007 Feb 1;61(3):348-58. Epub: 2006/07/04. PMID: 16815322.

6. Elmore DK, de Castro JM. Self-rated moods and hunger in relation to spontaneous eating behavior in bulimics, recovered bulimics, and normals. Int J Eat Disord. 1990;9(2):179-90.

7. Kessler RC, Shahly V, Hudson JI, et al. A comparative analysis of role attainment and impairment in binge-eating disorder and bulimia nervosa: Results from the WHO World Mental Health Surveys. Epidemiology and Psychiatric Sciences. 2014;23(1):27-41.

8. Bruce B, Wilfley D. Binge eating among the overweight population: a serious and prevalent problem. J Am Diet Assoc. 1996 Jan;96(1):58-61. Epub: 1996/01/01. PMID: 8537571.

9. Spitzer RL, Stunkard A, Yanovski S, et al. Binge Eating Disorder Should Be Included in DSM-IV: A Reply to Fairburn et al.'s "The Classification of Recurrent Overeating: The Binge Eating Disorder Proposal". Int J Eat Disord. 1993;13(2):161-9. PMID: 11927273.

10. Alegria M, Woo M, Cao Z, et al. Prevalence and correlates of eating disorders in Latinos in the United States. Int J Eat Disord. 2007 Nov;40 Suppl:S15-21. Epub: 2007/06/23. PMID: 17584870.

11. Agrawal A, Hinrichs AL, Dunn G, et al. Linkage scan for quantitative traits identifies new regions of interest for substance dependence in the Collaborative Study on the Genetics of Alcoholism (COGA) sample. Drug Alcohol Depend. 2008 Jan 11;93(1-2):12-20. Epub: 2007/10/19. PMID: 17942244.

12. Ozier AD, Henry BW, American Dietetic Association. Position of the American Dietetic Association: nutrition intervention in the treatment of eating disorders. J Am Diet Assoc. 2011 Aug;111(8):1236-41. Epub: 2011/08/02. PMID: 21802573.

13. de Baptista GA. Nutrients and dyspepsia: paradigms and reality. Curr Opin Clin Nutr Metab Care. 2005 Sep;8(5):562-7. Epub: 2005/08/05. PMID: 16079630.

14. Guerdjikova AI, O'Melia AM, Mori N, et al. Binge eating disorder in elderly individuals. Int J Eat Disord. 2012;45(7):905-8. PMID: 82606480.

15. Allen KL, Byrne SM, Oddy WH, et al. DSM-IV-TR and DSM-5 eating disorders in adolescents: prevalence, stability, and psychosocial correlates in a population-based sample of male and female adolescents. J Abnorm Psychol. 2013 Aug;122(3):720-32. Epub: 2013/09/11. PMID: 24016012.

16. Ackard DM, Fulkerson JA, Neumark-Sztainer D. Stability of eating disorder diagnostic classifications in adolescents: five-year longitudinal findings from a population-based study. Eat Disord. 2011 Jul-Aug;19(4):308-22. Epub: 2012/02/23. PMID: 22352971.

17. Whisman MA, Dementyeva A, Baucom DH, et al. Marital functioning and binge eating disorder in married women. Int J Eat Disord. 2012;45(3):385-9. PMID: 72678512.

18. Hudson JI, Lalonde JK, Coit CE, et al. Longitudinal study of the diagnosis of components of the metabolic syndrome in individuals with binge-eating disorder. Am J Clin Nutr. 2010 Jun;91(6):1568-73. PMID: 20427731.

19. Blomquist KK, Milsom VA, Barnes RD, et al. Metabolic syndrome in obese men and women with binge eating disorder: developmental trajectories of eating and weight-related behaviors. Compr Psychiatry. 2012 Oct;53(7):1021-7. Epub: 2012/04/10. PMID: 22483368.

20. Kessler RC, Berglund PA, Chiu WT, et al. The prevalence and correlates of binge eating disorder in the World Health Organization World Mental Health Surveys. Biol Psychiatry. 2013 May 1;73(9):904-14. Epub: 2013/01/08. PMID: 23290497.

21. Colles SL, Dixon JB, O'Brien PE. Grazing and loss of control related to eating: two high-risk factors following bariatric surgery. Obesity (Silver Spring). 2008 Mar;16(3):615-22. Epub: 2008/02/02. PMID: 18239603.

22. de Zwaan M, Hilbert A, Swan-Kremeier L, et al. Comprehensive interview assessment of eating behavior 18-35 months after gastric bypass surgery for morbid obesity. Surg Obes Relat Dis. 2010 Jan-Feb;6(1):79-85. PMID: 19837012.

23. Tanofsky-Kraff M, Cohen ML, Yanovski SZ, et al. A prospective study of psychological predictors of body fat gain among children at high risk for adult obesity. Pediatrics. 2006 Apr;117(4):1203-9. PMID: 16585316.

24. Austin SB, Ziyadeh NJ, Corliss HL, et al. Sexual orientation disparities in purging and binge eating from early to late adolescence. J Adolesc Health. 2009 Sep;45(3):238-45. Epub: 2009/08/25. PMID: 19699419.

25. Lang T, Hauser R, Buddeberg C, et al. Impact of gastric banding on eating behavior and weight. Obes Surg. 2002 Feb;12(1):100-7. Epub: 2002/03/01. PMID: 11868284.

26. Larsen JK, van Ramshorst B, Geenen R, et al. Binge eating and its relationship to outcome after laparoscopic adjustable gastric banding. Obes Surg. 2004 Sep;14(8):1111-7. Epub: 2004/10/14. PMID: 15479602.

27. White MA, Grilo CM. Psychometric properties of the Food Craving Inventory among obese patients with binge eating disorder. Eating Behaviors. 2005;6(3):239-45.

28. Kofman MD, Lent MR, Swencionis C. Maladaptive eating patterns, quality of life, and weight outcomes following gastric bypass: results of an Internet survey. Obesity (Silver Spring). 2010 Oct;18(10):1938-43. Epub: 2010/02/20. PMID: 20168309.

29. Green AE, Dymek-Valentine M, Pytluk S, et al. Psychosocial outcome of gastric bypass surgery for patients with and without binge eating. Obes Surg. 2004 Aug;14(7):975-85. Epub: 2004/08/27. PMID: 15329189.

30. Herpertz S, Kielmann R, Wolf AM, et al. Do psychosocial variables predict weight loss or mental health after obesity surgery? A systematic review. Obes Res. 2004 Oct;12(10):1554-69. Epub: 2004/11/13. PMID: 15536219.

31. First MB, Spitzer R, Gibbon M, et al. Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition. (SCID-I/P). New York: Biometrics Research, New York State Psychiatric Institute; 2002.

32. Cooper PJ, Taylor MJ, Copper Z, et al. The development and validation of the body shape questionnaire. Int J Eat Disord. 1987;6(4):485-94.

33. Fichter M, Quadflieg N. The structured interview for anorexic and bulimic disorders for DSM-IV and ICD-10 (SIAB-EX): reliability and validity. Eur Psychiatry. 2001 Feb;16(1):38-48. Epub: 2001/03/14. PMID: 11246291.

34. Beck A, Epstein N, Brown G, et al. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol. 1988;56:893-7.

35. Beck AT, Ward CH, Mendelson M, et al. An inventory for measuring depression. Arch Gen Psychiatry. 1961 Jun;4:561-71. Epub: 1961/06/01. PMID: 13688369.

36. Gormally J, Black S, Daston S, et al. The assessment of binge eating severity among obese persons. Addict Behav. 1982;7(1):47-55. Epub: 1982/01/01. PMID: 7080884.

37. Patton JH, Stanford MS, Barratt ES. Factor structure of the Barratt impulsiveness scale. J Clin Psychol. 1995 Nov;51(6):768-74. Epub: 1995/11/01. PMID: 8778124.

38. Derogatis LR. The Brief Symptom Inventory: Adminstration, Scoring, and Procedures Manual. Minneapolis: National Computer Systems; 1993.

39. Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. Psychol Med. 1983 Aug;13(3):595-605. Epub: 1983/08/01. PMID: 6622612.

40. Guy E. ECDEU Assessment Manual for Psychopharmacology - Revised. U.S. Department of Health, Education, and Welfare, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration, NIMH Psychopharmacology Research Branch, Division of Extramural Research Programs DHEW Publ No ADM 76-338. Washington, DC: 1976.

41. Garner D, Garfinkel P. The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. Psychol Med. 1979;9:273-9.

42. de Man Lapidoth J, Ghaderi A, Halvarsson-Edlund K, et al. Psychometric properties of the Eating Disorders in Obesity questionnaire: validating against the Eating Disorder Examination interview. Eat Weight Disord. 2007 Dec;12(4):168-75. Epub: 2008/01/30. PMID: 18227638.

43. Fairburn C. Eating Disorders Examination. Oxford; 1989.

44. Fairburn CG, Beglin SJ. Assessment of eating disorders: interview or self-report questionnaire? Int J Eat Disord. 1994 Dec;16(4):363-70. Epub: 1994/12/01. PMID: 7866415.

45. Garner D, Olmsted MP, Polivy J. Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. Int J Eat Disord. 1983;2:15-34.

46. White MA, Whisenhunt BL, Williamson DA, et al. Development and validation of the food-craving inventory. Obes Res. 2002 Feb;10(2):107-14. Epub: 2002/02/12. PMID: 11836456.

47. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983 Jun;67(6):361-70. Epub: 1983/06/01. PMID: 6880820.

48. Hamilton M. The assessment of anxiety states by rating. Br J Med Psychol. 1959;32(1):50-5. Epub: 1959/01/01. PMID: 13638508.

49. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960 Feb;23:56-62. Epub: 1960/02/01. PMID: 14399272.

50. Horowitz LM, Rosenberg SE, Baer BA, et al. Inventory of interpersonal problems: psychometric properties and clinical applications. J Consult Clin Psychol. 1988 Dec;56(6):885-92. Epub: 1988/12/01. PMID: 3204198.

51. Manwaring J, Wilfley D. The Impact of Weight on Quality of Life Questionnaire. In: Preedy V, Watson R, eds. Handbook of Disease Burdens and Quality of Life Measures. Springer New York; 2010:209-25.

52. Montgomery SA, Asberg M. A new depression scale designed to be sensitive to change. The British journal of psychiatry : the journal of mental science. 1979 Apr;134:382-9. Epub: 1979/04/01. PMID: 444788.

53. Spitzer R, Yanovski S, Marcus M. Questionnaire on eating and weight patterns-revised. Pittsburgh, PA: Behavioral Measurement Satabase Service; 1994.

54. Rosenberg M. Society and the Adolescent Self-Image. Princeton, NJ: University Press; 1965.

55. Ware JJ, Sherbourne, C.D. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. Med Care. 1992;30:473-83.

56. Ware J, Losinski M, Keller S. SF-36 Physical and Mental Summary Scales: A User's Manual. Boston, MA: The Health Institute; 1994.

57. First MB, Spitzer RL, Gibbon M, et al. Structured Clinical Interview for DSM-IV Axis I Disorders, Research Version, Patient Edition. New York: Biometrics Research, New York State Psychiatric Institute; 1997.

58. Leon AC, Olfson M, Portera L, et al. Assessing psychiatric impairment in primary care with the Sheehan Disability Scale. Int J Psychiatry Med. 1997;27(2):93-105. PMID: 9565717.

59. Sheehan DV, Harnett-Sheehan K, Raj BA. The measurement of disability. Int Clin Psychopharmacol. 1996 Jun;11 Suppl 3:89-95. PMID: 8923116.

60. Spielberger CD, Syderman SJ. State-trait anxiety inventory and state-trait anger expression inventory. Hilsdale, NJ: LEA; 1994.

61. Spielberger CD, Gorusch RL, Lushene RE. Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press; 1983.

62. Stunkard AJ, Messick S. The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. J Psychosom Res. 1985;29(1):71-83. Epub: 1985/01/01. PMID: 3981480.

63. Goodman WK, Price LH, Rasmussen SA, et al. The Yale-Brown Obsessive Compulsive Scale. I. Development, use, and reliability. Arch Gen Psychiatry. 1989 Nov;46(11):1006-11. Epub: 1989/11/01. PMID: 2684084.

64. Goodman WK, Price LH, Rasmussen SA, et al. The Yale-Brown Obsessive Compulsive Scale. II. Validity. Arch Gen Psychiatry. 1989 Nov;46(11):1012-6. PMID: 2510699.

65. Peterson CB, Mitchell JE, Crow SJ, et al. The efficacy of self-help group treatment and therapist-led group treatment for binge eating disorder. Am J Psychiatry. 2009 Dec;166(12):1347-54. Epub: 2009/11/04. PMID: 19884223.

66. Peterson CB, Mitchell JE, Engbloom S, et al. Group cognitive-behavioral treatment of binge eating disorder: a comparison of therapist-led versus self-help formats. Int J Eat Disord. 1998 Sep;24(2):125-36. Epub: 1998/08/11. PMID: 9697011.

67. Peterson CB, Mitchell JE, Engbloom S, et al. Self-Help Versus Therapist-Led Group Cognitive-Behavioral Treatment of Binge Eating Disorder at Follow-Up. Int J Eat Disord. 2001;30(4):363-74. PMID: 5527025.

68. Grilo CM, Masheb RM. A randomized controlled comparison of guided self-help cognitive behavioral therapy and behavioral weight loss for binge eating disorder. Behav Res Ther. 2005 Nov;43(11):1509-25. Epub: 2005/09/15. PMID: 16159592.

69. Grilo CM, Masheb RM, Wilson GT, et al. Cognitive-behavioral therapy, behavioral weight loss, and sequential treatment for obese patients with binge-eating disorder: a randomized controlled trial. J Consult Clin Psychol. 2011 Oct;79(5):675-85. Epub: 2011/08/24. PMID: 21859185.

70. Masheb RM, Grilo CM, Rolls BJ. A randomized controlled trial for obesity and binge eating disorder: low-energy-density dietary counseling and cognitive-behavioral therapy. Behav Res Ther. 2011 Dec;49(12):821-9. Epub: 2011/10/19. PMID: 22005587.

71. Carter JC, Fairburn CG. Cognitive-behavioral self-help for binge eating disorder: a controlled effectiveness study. J Consult Clin Psychol. 1998 Aug;66(4):616-23. Epub: 1998/09/15. PMID: 9735577.

72. Schlup B, Munsch S, Meyer AH, et al. The efficacy of a short version of a cognitive-behavioral treatment followed by booster sessions for binge eating disorder. Behav Res Ther. 2009 Jul;47(7):628-35. Epub: 2009/05/19. PMID: 19446793.

73. Shapiro JR, Reba-Harrelson L, Dymek-Valentine M, et al. Feasibility and acceptability of CD-ROM-based cognitive-behavioural treatment for binge-eating disorder. Eur Eat Disord Rev. 2007 May;15(3):175-84. Epub: 2007/08/07. PMID: 17676687.

74. Carrard I, Crepin C, Rouget P, et al. Randomised controlled trial of a guided self-help treatment on the Internet for binge eating disorder. Behav Res Ther. 2011 Aug;49(8):482-91. Epub: 2011/06/07. PMID: 21641580.

75. Wilfley DE, Welch RR, Stein RI, et al. A randomized comparison of group cognitive-behavioral therapy and group interpersonal psychotherapy for the treatment of overweight individuals with binge-eating disorder. Arch Gen Psychiatry. 2002 Aug;59(8):713-21. Epub: 2002/08/02. PMID: 12150647.

76. Hilbert A, Saelens BE, Stein RI, et al. Pretreatment and process predictors of outcome in interpersonal and cognitive behavioral psychotherapy for binge eating disorder. J Consult Clin Psychol. 2007 Aug;75(4):645-51. Epub: 2007/08/01. PMID: 17663618.

77. Tasca GA, Mikai SF, Hewitt PL. Group psychodynamic interpersonal psychotherapy: summary of a treatment model and outcomes for depressive symptoms. In: Abelian ME, ed. Focus on Psychotherapy Research. Hauppauge, NY: Nova Science; 2005:159-88.

78. Safer DL, Robinson AH, Jo B. Outcome from a randomized controlled trial of group therapy for binge eating disorder: comparing dialectical behavior therapy adapted for binge eating to an active comparison group therapy. Behav Ther. 2010 Mar;41(1):106-20. Epub: 2010/02/23. PMID: 20171332.

79. Telch CF, Agras WS, Linehan MM. Dialectical behavior therapy for binge eating disorder. J Consult Clin Psychol. 2001 Dec;69(6):1061-5. Epub: 2002/01/05. PMID: 11777110.

80. Grilo CM, White MA. Orlistat with behavioral weight loss for obesity with versus without binge eating disorder: Randomized placebo-controlled trial at a community mental health center serving educationally and economically disadvantaged Latino/as. Behav Res Ther. 2013;51(3):167-75. PMID: 85397433.

81. Agras S, Telch CF, Arnow B, et al. Weight loss, cognitive-behavioral, and desipramine treatments in binge eating disorder. An additive design. Behav Ther. 1994;25(2):225-38.

82. Arnold LM, McElroy SL, Hudson JI, et al. A placebo-controlled, randomized trial of fluoxetine in the treatment of binge-eating disorder. J Clin Psychiatry. 2002 Nov;63(11):1028-33. Epub: 2002/11/26. PMID: 12444817.

83. McElroy SL, Casuto LS, Nelson EB, et al. Placebo-controlled trial of sertraline in the treatment of binge eating disorder. Am J Psychiatry. 2000;157(6):1004-6.

84. McElroy SL, Hudson JI, Malhotra S, et al. Citalopram in the treatment of binge-eating disorder: a placebo-controlled trial. J Clin Psychiatry. 2003 Jul;64(7):807-13. Epub: 2003/08/26. PMID: 12934982.

85. Pearlstein T, Spurell E, Hohlstein LA, et al. A double-blind, placebo-controlled trial of fluvoxamine in binge eating disorder: a high placebo response. Arch Womens Ment Health. 2003 Apr;6(2):147-51. Epub: 2003/04/30. PMID: 12720065.

86. Hudson JI, McElroy SL, Raymond NC, et al. Fluvoxamine in the treatment of binge-eating disorder: a multicenter placebo-controlled, double-blind trial. Am J Psychiatry. 1998 Dec;155(12):1756-62. Epub: 1998/12/08. PMID: 9842788.

87. Ricca V, Mannucci E, Mezzani B, et al. Fluoxetine and fluvoxamine combined with individual cognitive-behaviour therapy in binge eating disorder: a one-year follow-up study. Psychother Psychosom. 2001 Nov-Dec;70(6):298-306. Epub: 2001/10/13. PMID: 11598429.

88. Leombruni P, Piero A, Lavagnino L, et al. A randomized, double-blind trial comparing sertraline and fluoxetine 6-month treatment in obese patients with Binge Eating Disorder. Prog Neuropsychopharmacol Biol Psychiatry. 2008 Aug 1;32(6):1599-605. Epub: 2008/07/05. PMID: 18598735.

89. Laederach-Hofmann K, Graf C, Horber F, et al. Imipramine and diet counseling with psychological support in the treatment of obese binge eaters: a randomized, placebo-controlled double-blind study. Int J Eat Disord. 1999 Nov;26(3):231-44. Epub: 1999/08/11. PMID: 10441239.

90. Guerdjikova AI, McElroy SL, Winstanley EL, et al. Duloxetine in the treatment of binge eating disorder with depressive disorders: a placebo-controlled trial. Int J Eat Disord. 2012 Mar;45(2):281-9. Epub: 2011/07/12. PMID: 21744377.

91. McElroy SL, Guerdjikova A, Kotwal R, et al. Atomoxetine in the treatment of binge-eating disorder: a randomized placebo-controlled trial. J Clin Psychiatry. 2007 Mar;68(3):390-8. Epub: 2007/03/29. PMID: 17388708.

92. Guerdjikova AI, McElroy SL, Kotwal R, et al. High-dose escitalopram in the treatment of binge-eating disorder with obesity: a placebo-controlled monotherapy trial. Hum Psychopharmacol. 2008 Jan;23(1):1-11. Epub: 2007/12/07. PMID: 18058852.

93. McElroy SL, Arnold LM, Shapira NA, et al. Topiramate in the treatment of binge eating disorder associated with obesity: a randomized, placebo-controlled trial. Am J Psychiatry. 2003 Feb;160(2):255-61. Epub: 2003/02/04. PMID: 12562571.

94. Stefano SC, Bacaltchuk J, Blay SL, et al. Antidepressants in short-term treatment of binge eating disorder: systematic review and meta-analysis. Eat Behav. 2008 Apr;9(2):129-36. Epub: 2008/03/11. PMID: 18329590.

95. Reas DL, Grilo CM. Review and meta-analysis of pharmacotherapy for binge-eating disorder. Obesity (Silver Spring). 2008 Sep;16(9):2024-38. Epub: 2009/02/03.

96. Vocks S, Tuschen-Caffier B, Pietrowsky R, et al. Meta-analysis of the effectiveness of psychological and pharmacological treatments for binge eating disorder. Int J Eat Disord. 2010 Apr;43(3):205-17. Epub: 2009/04/30. PMID: 19402028.

97. Berkman ND, Bulik CM, Brownley KA, et al. Management of eating disorders. Evid Rep Technol Assess (Full Rep). 2006 Apr(135):1-166. Epub: 2007/07/14. PMID: 17628126.

98. Gartlehner G, Hansen RA, Morgan LC, et al. Comparative benefits and harms of second-generation antidepressants for treating major depressive disorder: an updated meta-analysis. Ann Intern Med. 2011 Dec 6;155(11):772-85. PMID: 22147715.

99. Reichenpfader U, Gartlehner G, Morgan LC, et al. Sexual dysfunction associated with second-generation antidepressants in patients with major depressive disorder: results from a systematic review with network meta-analysis. Drug Saf. 2014 Jan;37(1):19-31. PMID: 24338044.

100. Kramer CK, Leitao CB, Pinto LC, et al. Efficacy and safety of topiramate on weight loss: a meta-analysis of randomized controlled trials. Obes Rev. 2011 May;12(5):e338-47. PMID: 21438989.

101. Campbell K, Peebles R. Eating disorders in children and adolescents: state of the art review. Pediatrics. 2014 Sep;134(3):582-92. PMID: 25157017.

102. Maradik Harris L, Boggiano V, Nguyen DT, et al. Working in partnership with interpreters: studies on individuals affected by HIV/AIDS in Vietnam. Qual Health Res. 2013 Oct;23(10):1408-18. PMID: 24062420.

103. National Institute for Health and Care Excellence (NICE). Eating disorders: Core interventions in the treatment and management of anorexia nervosa, bulimia nervosa and related eating disorders. National Institute for Clinical Excellence; 2004 http://publications.nice.org.uk/eating-disorders-cg9/guidance#atypical-eating-disorders-including-binge-eating-disorder. Accessed November 18, 2014.

104. Aigner M, Treasure J, Kaye W, et al. World Federation of Societies of Biological Psychiatry (WFSBP) guidelines for the pharmacological treatment of eating disorders. World J Biol Psychiatry. 2011 Sep;12(6):400-43. Epub: 2011/10/04. PMID: 21961502.

105. Ozier AD, Henry BW. Position of the American Dietetic Association: nutrition intervention in the treatment of eating disorders. J Am Diet Assoc. 2011 Aug;111(8):1236-41. Epub: 2011/08/02. PMID: 21802573.

106. Iacovino JM, Gredysa DM, Altman M, et al. Psychological treatments for binge eating disorder. Curr Psychiatry Rep. 2012 Aug;14(4):432-46. Epub: 2012/06/19. PMID: 22707016.

107. North Carolina Division of Health and Human Services Division of Medical Assistance. Surgery for clinically severe obesity: clinical coverage policy No. 1A-15. 2008 http://www.ncdhhs.gov/dma/physician/1a15.pdf. Accessed November 18, 2014.

108. Beronio K, Po R, Skopec L, et al. Affordable care acts expands mental health and substance use disorder benefits and federal parity protections for 62 million Americans. U.S. Department of Health and Human Services; 2013 http://aspe.hhs.gov/health/reports/2013/mental/rb_mental.cfm. Accessed November 18, 2014.

109. Hay PP, Bacaltchuk J, Stefano S, et al. Psychological treatments for bulimia nervosa and binging. Cochrane Database Syst Rev. 2009(4):CD000562. Epub: 2009/10/13. PMID: 19821271.

110. Perkins SJ, Murphy R, Schmidt U, et al. Self-help and guided self-help for eating disorders. Cochrane Database Syst Rev. 2006(3):CD004191. Epub: 2006/07/21. PMID: 16856036.

111. Brownley KA, Berkman ND, Sedway JA, et al. Binge eating disorder treatment: a systematic review of randomized controlled trials. Int J Eat Disord. 2007 May;40(4):337-48. Epub: 2007/03/21. PMID: 17370289.

112. Methods Guide for Effectiveness and Comparative Effectiveness Reviews. Chapters available at: www.effectivehealthcare.ahrq.gov AHRQ Publication No. 10(14)-EHC063-EF. Rockville, MD: Agency for Healthcare Research and Quality; January 2014. http://www.effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productid=318.

113. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. J Clin Epidemiol. 2009 Oct;62(10):1006-12. Epub: 2009/07/28. PMID: 19631508.

114. Berkman ND, Lohr KN, Bulik CM. Outcomes of eating disorders: a systematic review of the literature. Int J Eat Disord. 2007 May;40(4):293-309. Epub: 2007/03/21. PMID: 17370291.

115. Higgins JP, Altman DG, Gotzsche PC, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. BMJ. 2011;343:d5928. Epub: 2011/10/20. PMID: 22008217.

116. Viswanathan M, Ansari MT, Berkman ND, et al. Assessing the risk of bias of individual studies in systematic reviews of health care interventions: Methods guide for effectiveness and comparative effectiveness reviews [internet]. Agency for Healthcare Research and Quality Rockville, MD: 2012.

117. Viswanathan M, Berkman ND, Dryden DM, et al. Assessing risk of bias and confounding in observational studies of interventions or exposures: Further development of the RTI Item Bank. Methods Research Report. (Prepared by RTI–UNC Evidence-based Practice Center under Contract No. 290-2007-10056-I) Report No. AHRQ Publication No. 13-EHC106-EF. Rockville, MD: Agency for Healthcare Research and Quality; August 2013.

118. The Cochrane Collaboration. A Cochrane Risk Of Bias Assessment Tool: for Non-Randomized Studies of Interventions (ACROBAT-NRSI). https://sites.google.com/site/riskofbiastool/. Accessed December 15, 2014.

119. Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Med Res Methodol. 2007;7:10. Epub: 2007/02/17. PMID: 17302989.

120. Berkman ND, Lohr KN, Balk EM, et al. Grading the strength of a body of evidence when assessing health care interventions: an EPC update. J Clin Epidemiol. in press.

121. Berkman ND, Lohr KN, Ansari M, et al. Grading the strength of a body of evidence when assessing health care interventions for the effective health care program of the Agency for Healthcare Research and Quality: An update (AHRQ Methods for Effective Health Care Series. Report No.: 13(14)-EHC130-EF. Rockville, MD: Agency for Healthcare Research and Quality; November 2013.

122. McElroy SL, Kotwal R, Guerdjikova AI, et al. Zonisamide in the treatment of binge eating disorder with obesity: a randomized controlled trial. J Clin Psychiatry. 2006 Dec;67(12):1897-906. Epub: 2006/12/30. PMID: 17194267.

123. Ricca V, Castellini G, Lo Sauro C, et al. Zonisamide Combined with Cognitive Behavioral Therapy in Binge Eating Disorder: A One-year Follow-up Study. Psychiatry (Edgmont). 2009 Nov;6(11):23-8. Epub: 2010/01/06. PMID: 20049147.

124. Brambilla F, Samek L, Company M, et al. Multivariate therapeutic approach to binge-eating disorder: combined nutritional, psychological and pharmacological treatment. Int Clin Psychopharmacol. 2009 Nov;24(6):312-7. Epub: 2009/10/02. PMID: 19794312.

125. Molinari E, Baruffi M, Croci M, et al. Binge eating disorder in obesity: comparison of different therapeutic strategies. Eat Weight Disord. 2005 Sep;10(3):154-61. Epub: 2005/11/10. PMID: 16277137.

126. Appolinario JC, Bacaltchuk J, Sichieri R, et al. A randomized, double-blind, placebo-controlled study of sibutramine in the treatment of binge-eating disorder. Arch Gen Psychiatry. 2003 Nov;60(11):1109-16. Epub: 2003/11/12. PMID: 14609886.

127. Gorin AA, Le Grange D, Stone AA. Effectiveness of spouse involvement in cognitive behavioral therapy for binge eating disorder. Int J Eat Disord. 2003 May;33(4):421-33. Epub: 2003/03/27. PMID: 12658672.

128. Fichter MM, Quadflieg N, Gnutzmann A. Binge eating disorder: treatment outcome over a 6-year course. J Psychosom Res. 1998 Mar-Apr;44(3-4):385-405. Epub: 1998/05/20. PMID: 9587882.

129. Wilfley DE, Friedman MA, Dounchis JZ, et al. Comorbid psychopathology in binge eating disorder: relation to eating disorder severity at baseline and following treatment. J Consult Clin Psychol. 2000 Aug;68(4):641-9. Epub: 2000/08/31. PMID: 10965639.

130. Busetto L, Segato G, De Luca M, et al. Weight loss and postoperative complications in morbidly obese patients with binge eating disorder treated by laparoscopic adjustable gastric banding. Obes Surg. 2005 Feb;15(2):195-201. Epub: 2005/04/02. PMID: 15802061.

131. Grilo CM, Masheb RM, Wilson GT. Efficacy of cognitive behavioral therapy and fluoxetine for the treatment of binge eating disorder: a randomized double-blind placebo-controlled comparison. Biol Psychiatry. 2005 Feb 1;57(3):301-9. Epub: 2005/02/05. PMID: 15691532.

132. White MA, Grilo CM. Bupropion for overweight women with binge-eating disorder: a randomized, double-blind, placebo-controlled trial. J Clin Psychiatry. 2013 Apr;74(4):400-6. Epub: 2013/05/10.

133. Fairburn CG, Marcus MD, Wilson GT. Cognitive behaviour therapy for binge eating and bulimia nervosa: A comprehensive treatment manual. In: Fairburn CG, Wilson GT, eds. Binge eating: Nature, assessment, and treatment. New York: Guilford Press; 1993:361-404.

134. McElroy SL, Hudson JI, Capece JA, et al. Topiramate for the treatment of binge eating disorder associated with obesity: a placebo-controlled study. Biol Psychiatry. 2007 May 1;61(9):1039-48. Epub: 2007/01/30. PMID: 17258690.

135. Guerdjikova AI, McElroy SL, Welge JA, et al. Lamotrigine in the treatment of binge-eating disorder with obesity: a randomized, placebo-controlled monotherapy trial. Int Clin Psychopharmacol. 2009 May;24(3):150-8. Epub: 2009/04/10. PMID: 19357528.

136. McElroy SL, Guerdjikova AI, Winstanley EL, et al. Acamprosate in the treatment of binge eating disorder: a placebo-controlled trial. Int J Eat Disord. 2011 Jan;44(1):81-90. Epub: 2010/11/17. PMID: 21080416.

137. McElroy SL, Guerdjikova AI, Blom TJ, et al. A placebo-controlled pilot study of the novel opioid receptor antagonist ALKS-33 in binge eating disorder. Int J Eat Disord. 2013 Apr;46(3):239-45. Epub: 2013/02/06. PMID: 23381803.

138. Brownley KA, Von Holle A, Hamer RM, et al. A double-blind, randomized pilot trial of chromium picolinate for binge eating disorder: Results of the Binge Eating and Chromium (BEACh) Study. J Psychosom Res. 2013;75(1):36-42.

139. Fairburn CG. Overcoming Binge Eating: The Proven Program to Learn Why You Binge and How You Can Stop. New York, NY: Guilford; 1995.

140. Tasca G, Ritchie K, Conrad G, et al. Attachment scales predict outcome in a randomized controlled trial of two group therapies for binge eating disorder: An aptitude by treatment interaction. Psychotherapy Research. 2006;16(1):106-21. PMID: 19216230.

141. Dingemans AE, Spinhoven P, van Furth EF. Predictors and mediators of treatment outcome in patients with binge eating disorder. Behav Res Ther. 2007 Nov;45(11):2551-62. Epub: 2007/07/24. PMID: 17643390.

142. Eldredge KL, Stewart Agras W, Arnow B, et al. The effects of extending cognitive-behavioral therapy for binge eating disorder among initial treatment nonresponders. Int J Eat Disord. 1997 May;21(4):347-52. Epub: 1997/05/01. PMID: 9138046.

143. Grilo CM, White MA, Gueorguieva R, et al. Self-help for binge eating disorder in primary care: a randomized controlled trial with ethnically and racially diverse obese patients. Behav Res Ther. 2013 Dec;51(12):855-61. Epub: 2013/11/06. PMID: 24189569.

144. Dingemans AE, Bruna MJ, van Furth EF. Binge eating disorder: a review. Int J Obes Relat Metab Disord. 2002 Mar;26(3):299-307. Epub: 2002/03/16. PMID: 11896484.

145. Tasca GA, Balfour L, Presniak MD, et al. Outcomes of specific interpersonal problems for binge eating disorder: comparing group psychodynamic interpersonal psychotherapy and group cognitive behavioral therapy. Int J Group Psychother. 2012 Apr;62(2):197-218. Epub: 2012/04/04. PMID: 22468572.

146. Masheb RM, Grilo CM. Rapid Response Predicts Treatment Outcomes in Binge Eating Disorder: Implications for Stepped Care. J Consult Clin Psychol. 2007;75(4):639-44. PMID: 26111505.

147. Hilbert A, Tuschen-Caffier B. Body image interventions in cognitive-behavioural therapy of binge-eating disorder: a component analysis. Behav Res Ther. 2004 Nov;42(11):1325-39. Epub: 2004/09/24. PMID: 15381441.

148. Le Grange D, Gorin A, Dymek M, et al. Does ecological momentary assessment improve cognitive behavioural therapy for binge eating disorder? A pilot study. European Eating Disorders Review. 2002;10(5):316-28. PMID: 11820730.

149. Ricca V, Castellini G, Mannucci E, et al. Comparison of individual and group cognitive behavioral therapy for binge eating disorder. A randomized, three-year follow-up study. Appetite. 2010 Dec;55(3):656-65. Epub: 2010/09/28. PMID: 20870000.

150. Munsch S, Biedert E, Meyer A, et al. A randomized comparison of cognitive behavioral therapy and behavioral weight loss treatment for overweight individuals with binge eating disorder. Int J Eat Disord. 2007 Mar;40(2):102-13. Epub: 2006/11/08. PMID: 17089420.

151. Wilson GT, Wilfley DE, Agras WS, et al. Psychological treatments of binge eating disorder. Arch Gen Psychiatry. 2010 Jan;67(1):94-101. Epub: 2010/01/06. PMID: 20048227.

152. Munsch S, Meyer AH, Biedert E. Efficacy and predictors of long-term treatment success for Cognitive-Behavioral Treatment and Behavioral Weight-Loss-Treatment in overweight individuals with binge eating disorder. Behav Res Ther. 2012;50(12):775-85. PMID: 83298279.

153. Margraf J. Aus dick wird nicht du¨nn. Falsche Erwartungshaltungen. In: Roche E, ed. Hu¨lle und Fu¨lle. Dem Fett auf den Leib geru¨ckt. Basel: Hoffmann-La Roche; 2000.

154. Grilo CM, White MA, Wilson GT, et al. Rapid response predicts 12-month post-treatment outcomes in binge-eating disorder: theoretical and clinical implications. Psychol Med. 2012 Apr;42(4):807-17. Epub: 2011/09/20. PMID: 21923964.

155. Brownell K. The Learn Program for Weight Management. Dallas, TX: American; 2000.

156. Sysko R, Hildebrandt T, Wilson GT, et al. Heterogeneity moderates treatment response among patients with binge eating disorder. J Consult Clin Psychol. 2010 Oct;78(5):681-90. Epub: 2010/09/30. PMID: 20873903.

157. Diabetes Prevention Program Research Group. The Diabetes Prevention Program (DPP): description of lifestyle intervention. Diabetes Care. 2002 Dec;25(12):2165-71. PMID: 12453955.

158. Klerman GL, Weissman MM, Rounsaville BJ, et al. Interpersonal Psychotherapy of Depression. New York, NY: Basic Books; 1984.

159. Wilfley DE, Frank MA, Welch R, et al. Adapting interpersonal psychotherapy (IPT-G) for binge eating disorder: toward a model for adapting empirically supported treatments. Psychotherapy Res. 1998;8:379-91.

160. Malan D. Individual Psychotherapy and the Science of Psychodynamics. London: Butterworth; 1979.

161. Hilbert A, Bishop ME, Stein RI, et al. Long-term efficacy of psychological treatments for binge eating disorder. Br J Psychiatry. 2012 Mar;200(3):232-7. Epub: 2012/01/28. PMID: 22282429.

162. De Zwaan M, Mitchell JE, Crosby RD, et al. Short-Term Cognitive Behavioral Treatment Does Not Improve Outcome of a Comprehensive Very-Low-Calorie Diet Program in Obese Women With Binge Eating Disorder. Behav Ther. 2005 Winter2005;36(1):89-99. PMID: 16713407.

163. Malan D. Individual Psychotherapy and the Science of Psychodynamics. 2nd ed., Oxford: Butterworth-Heinemann; 1999.

164. Safer DL, Joyce EE. Does rapid response to two group psychotherapies for binge eating disorder predict abstinence? Behav Res Ther. 2011 May;49(5):339-45. Epub: 2011/04/05. PMID: 21459363.

165. Robinson AH, Safer DL. Moderators of dialectical behavior therapy for binge eating disorder: results from a randomized controlled trial. Int J Eat Disord. 2012 May;45(4):597-602. Epub: 2011/04/19. PMID: 21500238.

166. Telch CF. Emotion regulation skills training treatment for binge eating disorder: Therapist manual. Unpublished manuscript; 1997.

167. Rogers CR. Client-centered therapy. Boston: Houghton Mifflin; 1951.

168. Riva G, Bacchetta M, Baruffi M, et al. Virtual-reality-based multidimensional therapy for the treatment of body image disturbances in binge eating disorders: a preliminary controlled study. IEEE Trans Inf Technol Biomed. 2002 Sep;6(3):224-34. Epub: 2002/10/17. PMID: 12381039.

169. Cesa GL, Manzoni GM, Bacchetta M, et al. Virtual reality for enhancing the cognitive behavioral treatment of obesity with binge eating disorder: randomized controlled study with one-year follow-up. J Med Internet Res. 2013;15(6):e113. Epub: 2013/06/14. PMID: 23759286.

170. Castelnuovo G, Manzoni GM, Villa V, et al. Brief Strategic Therapy vs Cognitive Behavioral Therapy for the Inpatient and Telephone-Based Outpatient Treatment of Binge Eating Disorder: The STRATOB Randomized Controlled Clinical Trial. Clin Pract Epidemiol Ment Health. 2011;7:29-37. Epub: 2011/05/12. PMID: 21559234.

171. Nardone G, Portelli C. Knowing through changing: The Evolution of Brief Strategic Therapy. Crown House Publishing Limited; 2005.

172. Devlin MJ, Goldfein JA, Petkova E, et al. Cognitive behavioral therapy and fluoxetine as adjuncts to group behavioral therapy for binge eating disorder. Obes Res. 2005 Jun;13(6):1077-88. Epub: 2005/06/25. PMID: 15976151.

173. Claudino AM, de Oliveira IR, Appolinario JC, et al. Double-blind, randomized, placebo-controlled trial of topiramate plus cognitive-behavior therapy in binge-eating disorder. J Clin Psychiatry. 2007 Sep;68(9):1324-32. Epub: 2007/10/06. PMID: 17915969.

174. Grilo CM, Masheb RM, Salant SL. Cognitive behavioral therapy guided self-help and orlistat for the treatment of binge eating disorder: a randomized, double-blind, placebo-controlled trial. Biol Psychiatry. 2005 May 15;57(10):1193-201. Epub: 2005/05/04. PMID: 15866560.

175. Golay A, Laurent-Jaccard A, Habicht F, et al. Effect of orlistat in obese patients with binge eating disorder. Obes Res. 2005 Oct;13(10):1701-8. Epub: 2005/11/16. PMID: 16286517.

176. Grilo CM, Masheb RM, Wilson GT. Rapid response to treatment for binge eating disorder. J Consult Clin Psychol. 2006 Jun;74(3):602-13. Epub: 2006/07/11. PMID: 16822116.

177. Grilo CM, Wilson GT, Crosby RD, et al. 12-Month Follow-Up of Fluoxetine and Cognitive Behavioral Therapy for Binge Eating Disorder. J Consult Clin Psychol. 2012;80(6):1108-13. PMID: 83916642.

178. Grilo CM, Masheb RM, Crosby RD. Predictors and moderators of response to cognitive behavioral therapy and medication for the treatment of binge eating disorder. J Consult Clin Psychol. 2012 Oct;80(5):897-906. Epub: 2012/02/01. PMID: 22289130.

179. Boutelle KN, Zucker NL, Peterson CB, et al. Two novel treatments to reduce overeating in overweight children: a randomized controlled trial. J Consult Clin Psychol. 2011 Dec;79(6):759-71. Epub: 2011/11/30. PMID: 22122291.

180. Jones M, Luce KH, Osborne MI, et al. Randomized, controlled trial of an internet-facilitated intervention for reducing binge eating and overweight in adolescents. Pediatrics. 2008 Mar;121(3):453-62. Epub: 2008/03/04. PMID: 18310192.

181. Tanofsky-Kraff M, Wilfley DE, Young JF, et al. A pilot study of interpersonal psychotherapy for preventing excess weight gain in adolescent girls at-risk for obesity. Int J Eat Disord. 2010 Dec;43(8):701-6. Epub: 2009/11/03. PMID: 19882739.

182. Agras WS, Telch CF, Arnow B, et al. One-year follow-up of cognitive-behavioral therapy for obese individuals with binge eating disorder. J Consult Clin Psychol. 1997 Apr;65(2):343-7. Epub: 1997/04/01. PMID: 9086701.

183. Maxwell H, Tasca GA, Ritchie K, et al. Change in attachment insecurity is related to improved outcomes 1-year post group therapy in women with binge eating disorder. Psychotherapy. 2014;51(1):57-65.

184. Castellini G, Mannucci E, Lo Sauro C, et al. Different moderators of cognitive-behavioral therapy on subjective and objective binge eating in bulimia nervosa and binge eating disorder: a three-year follow-up study. Psychother Psychosom. 2012;81(1):11-20. Epub: 2011/11/26. PMID: 22116257.

185. Fichter MM, Quadflieg N, Brandl B. Recurrent overeating: An empirical comparison of binge eating disorder, bulimia nervosa, and obesity. Int J Eat Disord. 1993;14(1):1-16.

186. Fichter MM, Quadflieg N, Rehm J. Predicting the outcome of eating disorders using structural equation modeling. Int J Eat Disord. 2003 Nov;34(3):292-313. Epub: 2003/09/02. PMID: 12949921.

187. Fichter MM, Quadflieg N, Hedlund S. Long-term course of binge eating disorder and bulimia nervosa: relevance for nosology and diagnostic criteria. Int J Eat Disord. 2008 Nov;41(7):577-86. Epub: 2008/05/14. PMID: 18473335.

188. Linna MS, Raevuori A, Haukka J, et al. Reproductive health outcomes in eating disorders. Int J Eat Disord. 2013 Dec;46(8):826-33. Epub: 2013/09/03. PMID: 23996114.

189. Preti A, Rocchi MB, Sisti D, et al. A comprehensive meta-analysis of the risk of suicide in eating disorders. Acta Psychiatr Scand. 2011 Jul;124(1):6-17. Epub: 2010/11/26. PMID: 21092024.

190. White MA, Kalarchian MA, Masheb RM, et al. Loss of control over eating predicts outcomes in bariatric surgery patients: a prospective, 24-month follow-up study. J Clin Psychiatry. 2010 Feb;71(2):175-84. Epub: 2009/10/27. PMID: 19852902.

191. Eisenberg ME, Neumark-Sztainer D. Friends' dieting and disordered eating behaviors among adolescents five years later: findings from Project EAT. J Adolesc Health. 2010 Jul;47(1):67-73. Epub: 2010/06/16. PMID: 20547294.

192. Neumark-Sztainer D, Wall M, Larson NI, et al. Dieting and disordered eating behaviors from adolescence to young adulthood: findings from a 10-year longitudinal study. J Am Diet Assoc. 2011 Jul;111(7):1004-11. Epub: 2011/06/28. PMID: 21703378.

193. Goldschmidt AB, Wall MM, Loth KA, et al. The course of binge eating from adolescence to young adulthood. Health Psychol. 2014 May;33(5):457-60. Epub: 2013/08/28. PMID: 23977873.

194. Sonneville KR, Horton NJ, Micali N, et al. Longitudinal associations between binge eating and overeating and adverse outcomes among adolescents and young adults: Does loss of control matter? JAMA Pediatrics. 2013;167(2):149-55.

195. Field AE, Sonneville KR, Micali N, et al. Prospective association of common eating disorders and adverse outcomes. Pediatrics. 2012;130(2):e289-e95.

196. Hilbert A, Hartmann AS, Czaja J, et al. Natural course of preadolescent loss of control eating. J Abnorm Psychol. 2013 Aug;122(3):684-93. Epub: 2013/09/11. PMID: 24016009.

197. Hilbert A, Brauhardt A. Childhood loss of control eating over five-year follow-up. Int J Eat Disord. 2014 Jun 5Epub: 2014/06/06. PMID: 24899359.

198. American Psychiatric Association. Diagnostic and statistical manual of mental disorder (5th ed.). Fifth ed., Washington, D.C.: American Psychiatric Publishing; 2013.

199. Atkins D, Chang SM, Gartlehner G, et al. Assessing applicability when comparing medical interventions: AHRQ and the Effective Health Care Program. J Clin Epidemiol. 2011 Nov;64(11):1198-207. PMID: 21463926.

200. Devlin MJ, Goldfein JA, Petkova E, et al. Cognitive behavioral therapy and fluoxetine for binge eating disorder: two-year follow-up. Obesity (Silver Spring). 2007 Jul;15(7):1702-9. Epub: 2007/07/20. PMID: 17636088.

201. Vancampfort D, Vanderlinden J, Pieters G, et al. [The importance of movement-directed interventions in the multidisciplinary treatment of binge eating disorder: an overview]. Tijdschr Psychiatr. 2012;54(8):719-30. Epub: 2012/08/16. PMID: 22893537.

202. U.S. National Institutes of Health. ClinicalTrials.gov. Washington, DC: https://clinicaltrials.gov/ct2/results?term=binge+eating+disorder&pg=1. Accessed December 22, 2014.

203. Bardone-Cone AM, Harney MB, Maldonado CR, et al. Defining recovery from an eating disorder: Conceptualization, validation, and examination of psychosocial functioning and psychiatric comorbidity. Behav Res Ther. 2010 Mar;48(3):194-202. PMID: 19945094.